**Michael MacNeill** - Okay, thank you everyone for attending and welcome along to the VCE Specialist Mathematics Implementation of the 2023 to 2027 study design, where we're going to unpack some of the ideas around the revised study design. And we will, of course start with the acknowledgement of country. I would like to acknowledge the traditional custodians of the many lands across Victoria on which each of you are living, learning and working from today. For myself and those of us in the Melbourne metropolitan area, we acknowledge the traditional custodians of the Nations. We acknowledge country. We recognise Aboriginal and Torres State Islanders, peoples spiritual and cultural connection to country and acknowledge their continued care of the lands and waterways over generations while celebrating the continuation of a living culture that has a unique role in this region. I'd like to pay my respect to elders past, present, and emerging for they hold the memories, traditions, cultures, and hopes of all Aboriginal and Torres Strait Islander people across the nation and hope they'll walk with us on our journey.

Okay, so we'll start with the asking questions slide. If people do have questions that they wish to ask, they can access the all panellists part of the menu and submit questions through there. Then I'll move on to the general outline slide. So, the notion of this is that we're going have a full suite of mathematics webinars. This is just the first of four of them with the intention that we are going to outline the structural changes that are developed through the revisions. I'm going to outline the area of study revisions and assessment revisions as they stand and discuss how teachers can engage with the assessments across units one, two, three, and four.

Prior to this webinar, you would've had access to a Qualtrics survey where you could've submitted some frequently asked questions and the most frequent of those, I've selected to address during the webinar. Of course, if time doesn't permit and we don't get to all of those, or if some of those questions aren't addressed during the course of the webinar, then my details will be available at the end or on any of the study design pages for the math subjects and you can feel free to email me or call me to discuss any of the questions that you might have.

Moving on to the study design. So, the revised study design for 2023 to 2027, a little bit of a background was a result of a thorough consultation process and review process. The VCE studies have been benchmarked against international standards. There was consultation amongst various sectors, government Catholic and independent, as well as stakeholders across the tertiary sector. The main high-level revisions to the study design across the four subjects. The really, the big obvious ones were revisions in specialist maths. And that's why we're here today.

And there was also the introduction of the foundation mathematics study at units three and four, which was the other really standout revision to the study design. And the VCAA role beyond curriculum restructure will be for us to help provide support to schools in their understanding of their responsibilities around the revised study design and awareness of where their practise may need to evolve to address the requirements of the new study design.

And moving on to slide seven there. The revised study design refers in preambles for each of the units one and two and unit three and four to the notion of assumed knowledge. And this is a bit of a new addition to it. It provides students with a good indication, the skills and knowledge from the subject that will facilitate their learning across the sequence. And confusion can sometimes arise in math studies around the distinction between what is considered examinable and what is considered essential conceptual basis for learning development of key knowledge, key skills within the parameters, defined through the areas of study. Not all elements of essential learning for unit one, two, three and four would appear on exam papers. Nonetheless, they need to be addressed as they form firm pedagogical basis for the understanding of the topics.

The examinations units three and four are constructed around the key knowledge and key skills listed under units three and four for the particular study and in the mathematics studies. Those key knowledge and key skills find contextualization through the lens of the areas of study. That's something that's been a historical construction, and it continues to be the case for the 2023 to 2027 study design. A perennial question which crops up at least once a year I'm sure, can students study units three and four specialist maths without previously, or concurrently studying units three and four Maths Methods? The answer is that it is technically permitted. However, please apply the lens of common sense should any students ask around that sort of a question. I'll move on to slide eight there, Kevin.

All right, so let's start looking at some of the differences in units one and two. I refer to them as revisions rather than changes or new material. We want to look in in decent detail at what those particular changes are and some of the implications there or thereof. Oops, there we go. All right, so unit one and two of the areas of study. One of the big changes that you'll notice is that unit one has got two areas of study and units two, sorry, unit two has four areas of study, which is a little bit different. It's certainly a change from the previous study design structuring. Unit one has had the greatest change, of course, and much of the content for proofs graph theory and logic is very reminiscent of the specialist maths logic and proof module from around the '94, '95, '96 era.

And I mentioned those times as a means of alerting teachers to what might be useful material and where they may, if they've hung onto it, or if they've got access to it may find useful material to assist in their teaching. The proofing techniques and processes area remains unchanged. That's similar to the previous iteration or the current iteration of the study design. Graph theory. Excuse me, now includes some trails and circuits, oil circuits, and trails, Hamiltonian cycles and paths, and the Konigsberg Bridge Problem. These are explicitly written into the study design and additions to the logic and algorithms include binary number system, clarification of gates as logic gates, and a procedural approach to algorithms and computational thinking with a specific focus on the reserve phrases for pseudocode. We'll be talking about pseudocode later.

And I forgot to mention that my co-presenter today is Kevin McMenamin. I will introduce him at a later stage in the webinar and he will be talking about pseudocode at that stage. The addition of first order linear recurrence relations into unit one and the as applied to finance and population modelling. Number properties and counting techniques and simple combinatorial identities has absorbed the notion of Pascal's triangle. Matrices is introduced as well. And these of course will be very useful for vectors and determinants for cross products, which are going to appear in units three and four.

Moving on to slide nine now. Highlighting again, some of these changes, very similar changes. Here we go. From unit two now on slide 10. Greater clarification of the distributions of sums of discreet random variables. And although, I mean, I'm talking about revisions and new things that are in there, but I don't see population proportions in there. I think they may have been in the previous iteration of the study design. Sine and cosine rule are now applied in three dimensions, including angles between planes. And this will again be good introductory material for topics explored in units three and four. There are some clarifications to the transformation points in unit two. Elementary vectors area of study now includes the application of vectors within kinematics.

Now, although the kinematics area of study as a standalone area of study is no longer available, appropriate time ought to be set aside, to explore the notions in preparation for units three and four, keeping in mind, of course, that this is occurring within the vectors area of study. And complex numbers now sees much of the polar representations, either algebraic or in the argand plane positioned in unit two. I'll talk a little bit about that when we get to the unit three and four section, however, there'll be some overlap I would imagine. And I'll describe that like I said, when I get to the unit three and four section. It should also be of note that graphs of sec, cosec and cotan and the inverse functions on restricted principal domains, sine, cosine and tangent are now also positioned in unit two.

And there are some elements that have been removed slash deleted. And these are important to know geometry in the plane and proof only sine, cosine, arc segments, and sectors of circles remain. And for graphs of non-linear relations, polar parametric graphs of relations like limacon, cycloid, they're gone, kinematics have already addressed, and simulations and sample proportions are gone. Unit three and four specialist maths does see a little bit of a restructure and you'll see the areas of study listed there.

Now I will point out that that in that list is not the, we won't see trigonometry. Some of you may have noted that the elements of trigonometry are not listed as an area of study. Trigonometry does of course appear as part of calculus and in particular with integration. So, a solid background on the trigger identities will remain something which is essential for unit three and four. Okay, so area of study, one logic and proof find great contextualization through numeric proofs. However, provision is in the study design for expanding these ideas. Similarly, to the vector proofs that have been in the study design for however many years they've been in. And while the complexity of proofs could extend the constraints of an exam may mean that there's a ceiling on how extensive exam questions may be. However, there'll be more of an indication through the sample questions that emerge later in the year.

Complex numbers. I did say that I would address these. In the unit three and four writing of the study design, they start with the DeMoivre's Theorem. Now DeMoivre's Theorem, there needs to be a need to utilise DeMoivre's Theorem, and the rectangular form provides great contextualization for this. And similarly in the key knowledge and skills representation, the argand plane retains its implicit inclusion of lines and circles. Vectors, and Cartesian equations. Vector equations of parametric equations of curves in two or three dimensions involving a parameter and the corresponding Cartesian equation in two dimensions. Vector equations of a straight line, given the position of two points or equivalent information in both two and three dimensions, vector cross product, normal to a plane parametric and Cartesian equations of a plane. These are all in the new study design and will require exploration.

There has, of course been an expansion and I'm on slide 14 now. Now, Kevin, there's been an expansion of the probability components for the area of study six, including a more explicit writing of the hypothesis testing. Now this writing is really to expand what the explorations might be without necessarily developing too much complexity in the teaching, at the teaching level of that particular topic area. The hypothesis testing, I don't believe has altered too much. It has really just made more, been made more explicit in its representation. And then of course the elephant in the room is the topic of mechanics, which is no longer present in the study design. Of course, there's been much discussion about this, and I think we've sort of reached a point where we need to recognise that the past is for reference not residence and we're moving on from the mechanics. It remains a great area of study. It's just at the moment, not in the study design.

So, Kevin, it may well be up to you. I'm going to hand over to you at this stage to discuss mathematical investigations.

**Kevin McMenamin** - Thanks, Michael. The investigations part of the new study designs have been initiated in unit one and two as a prelude really to the SAT tasks that are then going to run in unit three and four. These investigations have been built into the curriculum. So, through unit one and then unit two, you would actually undertake these investigations, think of them as smaller options or smaller versions of the SAT tasks that do run in unit three and four. They can run from one to two weeks. The investigations that you undertake generally would be linked to your routine teaching and learning that's going on. The integration into unit one and unit two should be a flow on effect of material that's being studied generally at that time if you were looking to incorporate a few of the areas of study or a few areas of content, then certainly placing it at a prime position would be paramount to your sample course, or your course that you're going to structure through both of those units.

In terms of the development of these particular items, generally the idea of the concepts and skills that are being utilised or introduced into the units would certainly be the focus of many of these that you are going to undertake. In terms of how you might go about these tasks, they're generally split into three separate items, the formulation part of it, where you're going to come up with a research, a bit of investigation, what sort of questions do you want to go and look at? What are you trying to get out of this particular task? Generally setting up the whole idea of the investigation itself, and then exploration, finding out how that particular question can be investigated or developed. What sort of areas of content can now be introduced to give it a little bit more depth? The idea of trying to be able to have some form of connection to material that's already been done, maybe a little bit more of a development of some content, even the introduction of some areas of learning might be done through these particular investigations and then how that information would be communicated. There are a variety of options that you might undertake to communicate. Could be in a written form, could be presented in posters, could be through a video presentation.

So, the communication element is as important as the exploration, the findings that actually go along. And the emphasis of that communication of course then lends itself strongly, I think to the unit three and four areas where the development of SAC material and investigation, problem solving, or modelling becomes paramount through those units specifically. The idea of the investigations can be through general classroom work, a learning activity. It could be an assessment task, an investigation. A learning activity that you might want to consider in terms of development of some learning areas. You might be doing some proof work. You might be coming up to a particular method or a technique that you're trying to investigate. And rather than just developing it within the room itself, you may then put that into some sort of an investigation. The idea of getting your students to research a little bit, do a little bit of developmental work, maybe communicate, consult amongst themselves.

That learning activity and its structure of course does need to take on the three components, the formulation, exploration, and communication, and therefore it would fit into this category. The assessment task it does or does not have to be. You might want it as an assessment task, that's fine. Could be a combination of both of them, both the learning activity and the assessment task, but the idea of integrating them really is a focus of your course, as you are setting it up. It is indicating the length of it should really be over a certainly a few classes, whether that is in one specific week or whether it runs across two weeks is really up to you and how you want to develop these sorts of skills that you're actually implementing. The examples that you can certainly be coming up with are quite varied. I might decide, for example, with the graph theory, the idea of networks, the definitions that actually come up in that particular topic area, I might want the students to develop that through some sort of research.

So rather than me trying to introduce it into the classroom explicitly that there's a few prompts, that idea of the formulation, and then go and get them to explore and so on. So, the development of that particular area could very well be done through a learning activity or what we are classing as this investigation. Because of its prominence certainly within units one and two, there does need to be a fair bit of planning that should be undertaken to make sure that these sorts of tasks are constructed quite well. If they're done in the course of your learning and teaching, generally the context should fit in naturally with where you are going and what you are developing in terms of area of study, content, anything else that's actually there.

If there's case to bring in components of a course that peripheral, the idea of computational thinking should be inherent in pretty much all of the work that would be done in any mathematics course as to whether you stipulate it specifically as this is computational thinking, really would be a choice of yours in setting up these courses, but any sort of work that would go towards finding some sort of a solution or some pathway to formulate a research, this computational thinking generally that would come into that style of learning as you go. The idea of experimentation. Again, maybe it comes up particularly in maybe a statistical or probability area that you want a little bit of experimentation done, maybe through vectors, the idea of movement of particles, certainly that experimentation can be brought into it, but again, really trying to fit in with the teaching and learning that's actually going on throughout.

Generally, students in unit three and four at the moment with the nature of SAT tasks and specifically the openness of many of those tasks, they do find it difficult to work out some sort of an approach that they can use to investigate these sorts of questions. This idea of the investigations in unit one and two, certainly open up that possibility where a lot of this pre-work or pre-thinking ways of exploration should be then commonplace for them by the time, they actually walk into that unit three and four level, and therefore be quite useful as they go along.

Therefore, in terms of their importance, I think they become quite critical to be able to set these up well for students to then be able to undertake. An example I had mentioned before about graph theory. This one looks at the idea of linear occurrence. The nice thing about this particular investigation that's used as an example is the idea of the coding that could take place, for example, in a spreadsheet, and the notion of coding, computational thinking, pseudocode, we will get to in a little while, but anything where coding is done in some sort of an electronic format, really can be constructed under that computational thinking banner, can also help them significantly regarding technology and by way, here spreadsheeting.

So, the use of these sorts of technology items, where it can enhance and influence some of the pathways or outcomes that you can get via investigations, then become pretty big based on where this particular question begins. So, this would be generally the formulation idea initially, can quickly be seen how it can develop into an exploration. The idea mentioned here is about three businesses as to what those businesses are or how they're set up, maybe as a learning activity or an investigation. You decide to scaffold this maybe a little bit more, suggesting a particular business that might in fact be explored, maybe giving them an option of three or four of them to go and investigate, see which ones seem to fit in well with this whole idea of recurrence, maybe one better than the other.

So, the generalising of a topic area, I think is pretty important as you work your way through the second half of this particular year, knowing that these are coming in in 2023, the general idea would be when you get an idea for an investigation to go and write it down, keep some sort of a list of these topics that you're coming up with. Once you've got a good topic, it can then be developed into an investigation quite easily. You are thinking that you would then put in place of how it can be developed, can then come over a few months. Many of us try to get these investigations or SAT tasks written in a week because we are handing it or we're trying to do it in the next two weeks, but the recommendation is that you try and think of topic areas well before the time that you are wanting to be able to present them. So, you've given the thought of in this case, the formulation, how it then can be explored and how you might communicate at the same time. So just looking at this example, you can see how well it can be developed into an investigation in that unit one and two area. Over to you, Michael.

**Michael MacNeill** - Sorry about that folks. I was on mute there. One of the other adjustments which has occurred in the study design is a change in the weightings of the school assessed coursework and the examinations. Now this is in the study design. This is a capture directly from the study design, but it's something to be aware of in your teaching. Next slide, please, Kevin.

And the application task is another one that I think we need to, needs to be cognizant of. One of the questions that, and I also want to acknowledge that there are some questions coming through the Q&A. I'll be addressing them when we get to the frequently asked questions as well. And for those of you who did write those questions in, at least two of them are already in the frequently asked questions. So, we'll address them close towards the end. The application task has not changed I don't think significantly, and it does cover the three outcomes which are listed here. Kevin, do you want to talk to this one?

**Kevin McMenamin** – Yep, back over to me. So just following on from Michael in the application task, and then the problem solving or modelling tasks that is set up, one of the ideas behind any of the maths disciplines that you are going to be looking at in the 2023-2027 study design is the idea of setting these up in an explorative an applicable type of mathematical format, trying to set particular questions that are closed, have no scope for exploration, really are trying to direct students isn't sitting in the framework of where most of these application tasks should be, going back to the three outcomes that Michael was just alluding to previously.

And the descriptions that are actually given as part of the application task problem solving or modelling is an element of openness exploration, the development of pathways or solution models that can be integrated into these questions. The idea of the application and problem solving, modelling tasks, they are restricted to time. And initially when you start writing these sorts of tasks, and there's an example currently on the screen, as you start to develop these, one of the items that is a critical component of any of the application problem solving or modelling is to build in thinking time. The idea being that you want the students to explore and get some sort of familiarisation with patterns or generalised formats, maybe features of images that you might be looking to get them to go and acknowledge, or to explore through that process of application. And to be able to do that, you do have to build in the thinking time.

Generally, if you were going to try and set some sort of an assessment based on recall of knowledge, facts, or skills, you would set your time limit and then go and allocate marks accordingly. This doesn't fit that particular model or criterion and isn't meant to the idea of trying to set these up accordingly is to give that opportunity for students to show what flare they might have in mathematics beyond a straightforward question that is just covering a fact or a skill. In this one, you can see that part one is being developed. There's an idea of a specific rational function being given initially. That's then developed a little bit further. And as you scope through this particular task, leaving it completely open, doesn't give the student a guide as to how they should get into the question.

Certainly, scaffolding in the early features or early parts of any of these tasks would be expected where you're giving the student an opportunity to get themselves into the question, have an understanding of possibly what mathematics is going to be involved, being familiar with technologies that might actually be integrated into the task itself. And from there, you then get them to formulate some sort of exploration as to how far that exploration goes. Really then depends on what scope you're giving them to explore. Generally, these sorts of questions, there is no limit to what exploration can be undertaken, but one of the items as they were working through would be the idea of repetition, utilising mathematics that's fairly similar, but not moving forward in the task itself. And this would then come into the assessment of the task itself. The idea of a rubric is certainly being encouraged for a lot of these tasks, where it's a global idea that you're giving to the marking of these particular tasks themselves, whether you want to allocate outcomes for each part and proportion those throughout.

So, three parts you might decide to allocate the outcomes in certain weightings, you might decide that students are certainly going to be spending more time on part one and part two. So, you might heavily wait those in the three outcomes. So, the proportional number of marks that are being given for this task heavily integrated into part one and part two. And because your thought is that they may not get too far into part three, that that's then minimised in terms of those marks that are then allocated. You can then adjust your marking accordingly based on student response. So, as you are looking at responses of student afterward, you might have come up with a set of ideas for your rubric, your assessment style, but based on where students have developed solutions, the idea would be you'd go back and recalibrate what that marking might actually look like on the rubric integration of pathways of students possibly that you had missed or hadn't even thought of. And that's where they then get the opportunity to use their understanding of mathematics, their appreciation of it, to give you an appreciation of their knowledge, which I think is a wonderful opportunity through these particular tasks.

And as we were speaking earlier, those investigations that you are building into unit one and two, certainly give them opportunity to explore and then build into these sorts of tasks by the time they come to unit three and four. The other part of the course that's being developed a little bit is the idea of the computational thinking. I did mention previously with the example of the unit one and two investigation, the spreadsheeting and coding that would actually go into that. But the idea of a pseudocode, the use of coding to represent some sort of an algorithm is part of essentially the study designs that are now coming in. How these are then developed by you throughout your courses, there are many opportunities through topics that you can integrate these algorithms or pseudocode if you like to bring it into the student's thinking in any opportunity where they have to introduce the idea of either writing an algorithm or being able to read an algorithm or to transfer an algorithm in written form into some sort of a format in a piece of software or technology, really would be part of your development of this particular area itself.

The algorithms and pseudocode generally would be linked directly to material that's being studied in any one of units, one to four, but we're not talking of algorithms that might be pages and pages long. These, as I said, are directly linked. And as you can see, just from the very simple one, that's currently sitting on the screen now. The idea of something small and straightforward that a student would be able to work through, either develop or interpret is really part of what this introduction of computational thinking via pseudocode is integrating into the study designs. And the computational thinking itself really does cover a broad range of ideas and thinking, I did mention earlier as I was chatting, the idea that computational thinking is generally going to come into most of the mathematics that you would be either looking to construct or to find some sort of a solution pathway, the development of ideas into a recognisable form that might actually come to form some sort of a solution. And there's a beautiful poster there that really does depict a lot of the ideas through this computational thinking. And I know the, the VCAA had these as available products not too long ago.

So even one of those being used and utilised certainly does highlight the areas of computational thinking that I think should now be integrated into these areas. Even looking back at the F-10 areas, computational thinking is also a major component. So, bring it in by the pseudocode in this instance or any coding writing really is a good introduction as we go forward.

**Michael MacNeill** - I'll be talking a bit to that in a moment as well. I think a couple of comments on algorithmic thinking and computational thinking. But thank you for that, Kevin, what I've got here is a representative sample of the frequently asked questions from the Qualtrics survey. And so, we'll, and I think these also appeared in the question-and-answer section, and again I'll try and address these as completely as I can. And of course, if I don't, then please feel free to email me slash call me on the phone or whatever.

So, support material will be made available. There has been support material written for all four of the maths' and it has been generated. It does need to be quality assured before it gets released. Support material is one of those things that we want to make sure that we get right first time. We don't want to be going back and forth or finding an area. So, there's a significant amount of energy and effort that goes into that. Of course, the VCAA like any other organisation at the moment has needed to move a little slower in recognition of the fact that that people have had had COVID and other sicknesses across the course of wintertime. So, it has been a little bit slower than we may have hoped for. That said, I think wherever I've answered questions regarding this, the support material I have said would be made available across the course of the second half of the year.

So being in August, we've just entered the second half of the year. We're a little bit of the way in anyway, July and August, but across the course of the second half of the year is when we're intending for it to be made available and available via the website, the VCAA website, probably via also the study design pages. Sample SACs be published by the VCAA. There's been a reluctance, I think, to produce sample SACs. And I think that the reason for that is because of difficulties with authorization. If the VCAA do publish a sample SAC, then there will be multiple places that are going to utilise that particular SAC, which can lead to issues of authentication. And so that's the reasoning behind not doing it. Having said that, I think that there is a call for a structural indication, which has been emerging across time and has evolved across time. And I think there's definitely a space for that. And again, what we develop for support material will be available via the website.

Will pseudocode be examinable? Pseudocode appears in the key knowledge and key skills for units three and four. It is examinable to a certain extent. However, I think there needs to be a recognition of what exactly pseudocode is and where it fits as a link between actual coding utilising a particular language, which may be something like a I'm reaching to antiquity here, Pascal, or Fortran, or basic, or VB or C++ or any of the computing languages, which happen to be around now, which MATLAB, Mathematica, Python, any of those somewhere between by hand mathematics and the actual coding within a compiler will exist this notion of pseudocode.

And pseudocode, like what was written on the slide should be written in plain English. However, there are reserve words for things like iteration or for if-then-else loops. Now those reserve words would need to be known to students as well as what a batch of pseudocode might output. And students should also be able to construct a small element of pseudocode that they could apply to an algorithm. I'll address algorithms in a moment. An algorithm thinking, that's one of the later questions. However, I think pseudocode being new, always is a little bit of an alarm bell. However, when we look into it a little bit further, pseudocode, doesn't have to be that scary. It is across Math Methods and Specialist Mathematics and will be examinable in both of those subjects. The notion of particular algorithms which might, to which pseudocode may be linked is it will emerge in the study designs themselves. Something like Euler's method in specialist, Newton's method in methods. The SAC structure has it effectively changed, not particularly in this iteration of the study design.

We've got the application task in unit three, and we've got a couple of problem solving and modelling tasks where it has changed a little bit, even then, I'm not sure that it's literally a change or a revision, is the allocation of topic areas to the problem-solving tasks at the back end of unit four. And that’s listed in the study design, that one of those tasks should be on probability and statistics. Okay I'll flip back to, I have to apologise when I'm filling in the sound gaps as I'm flipping between screens here, on a single screen, which makes it a little bit different, difficult at times.

Okay, so algorithmic thinking, what does it look like? Now these are the question that has been asked. Algorithmic thinking has been in the F-10 curriculum for a good number of years now. It's been at least implicitly in the previous the current iteration of the study design and is a notion of how we might think. I was looking at a definition from antiquity here from Knuth 1985, algorithmic thinking is a set of well-defined processes. I think it's something that we're all already doing. Well defined processes, the structure of a sequence of operations being performed. Now, these are things that teachers, math teachers in particular are already doing in most of what, most of the way that they teach in various areas. And the distinction then for computational thinking, I like that poster, which is on a previous slide. We don't have to flip back to it, Kevin, but the notion of decomposition and pattern recognition really stand out for computational thinking as a means of then engaging algorithmic thinking. The pseudocode then fits in as a means of connecting these ideas together, which I think works very well in that regard.

I'll flip across to the Q&A here and see I'm now on the webinar Q&A and see. One of the questions from an attendee asks, "Would panellists suggest an approximate timeline for the sample exams of the 2023 to 2027?" They are in development. I would be expecting them towards the back end of the year or early next year. But again, these are the kinds of things that we want to get right. And that's what we want to make sure of. I can tell you that there's been, there's a lot of effort from a lot of people going into ensuring that that these, that the sample questions or the sample exams are being developed to appropriately reflect the revisions to the study design.

And to what extent will pseudocode be examinable in the external examinations? That is, I feel like I've addressed that one already in terms of the extent to which students should be able to develop their own pseudocode, or to be able to examine a batch of pseudocode. And I think Kevin, as part of what he was saying, indicated that that shouldn't go for pages and pages. I'm reminded of the vector proofs that were enlisted in the current iteration of the study design. And the fact that I think we could, if we wanted to explore vector proofs far beyond what could reasonably be examined if we wish to, and in an examination, you only take one or two steps towards what that greater extent of what you know, where vector proofs could go is going to be.

And it's very similar for pseudocode. If you really wish to, then you could develop some significant batches of pseudocode, heavily linking multiple algorithms together, if you so desire. That's not really the intention here. We do know that or certainly at the university level for multiple years, that there's been a link, a part of the mathematics courses whereby hand maths gets linked to a coding language, and there needs to be an in between step. Our job in VCE is to prepare students for that reality that they're going to encounter. And so, in that sense, this is where we're going with the extent to which it would be examinable. I think there's been a few more people writing things in.

There's a question about the rollout of one to four in 2023, and will there be assumptions for the first run that students have not been exposed to the new content? There was an advice to teachers which was released last year, indicating what the changes were going to be, and also indicating a proposed set of topics from the current study design that would appropriately prepare students for the unit three and four study design, which will exist for 2023. Oops, it's flipped on me again, there we go. We go, and in terms of useful, this is another question in terms of useful resources, would VCAA make the past VBOS exams available for teachers and students? We would need to have access to those exams to make those available. What I can say is that they do exist in a variety of places and a lot of potential archives. There are materials that exist from the MAV, from those times and textbooks from those times and earlier, which do provide material. New textbooks that are going to be coming out next year will also have material. We're not looking to recycle the past.

And so, one message that I don't want to have taken away from here is that if I go to a textbook from 1986, and I copy verbatim from that, what the course is, then that's not exactly where we're going. Maths is an evolving subject. And so, we want to be moving forward from there. Computational thinking and pseudo. There's a big question from someone here. I'm not sure I'll get to all of that very conscious of time on here. Computational thinking and pseudocode assessed on the exam. I'll refer to the sample questions for that. We're not leaving people in the dark on this. The sample questions and the sample exams that come out are going to go a long way towards giving good indications of what will be, what the requirements are going to be. Very conscious of time here, at 4:50. We may need to move on from here then.

So, if I haven't gotten to your question, then that is, or the way to get in touch with me to gain answers to those questions is right on the screen at the moment. You can also get my email as a link, along with phone numbers, et cetera, on the study design. This is a Specialist Maths webinar. So, if you go to the Specialist Math Study page, then you will have access to all of this. This is really just replicated directly from there and you can get in touch that way. I'm very conscious that that most of the attendees are going to be teachers. I want to thank you for your time tonight. After a day in class, it's always good fun to go and listen to one or two people talk while we sit down. And I want to recognise the efforts that you are currently putting in and thank you for that. I hope that in some way, myself and Kevin have been able to provide some level of clarity around the changes. Of course, I don't believe one second that we've provided all of the clarity that you require. And that's okay. Like I said, the contact details are on the screen, and I'm quite happy to engage in conversation with people to help them to provide the appropriate courses for the students that are under their care for next year and beyond. So again, I thank you for your time and I think that's where we're finishing up tonight.

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