[MUSIC PLAYING]

KAREN FOLEY: Hello. And welcome back to the Student Hub Live, where maths is fun. Well, we all know maths is fun. But joining me today are Sally Crighton and Katie Chicot. Now, Julia can do a Rubik's cube in 47 seconds, which is her best time. Do you think that's impressive? I do.

KATIE CHICOT: I think it's massively impressive. I can only do it by moving the stickers.

KAREN FOLEY: I was just going to say that's how I can do that. It takes forever to peel them off.

SALLY CRIGHTON: I've never successfully completed it. Well done.

KAREN FOLEY: So yes, nice work. We're impressed. So we have here some lovely maths tools for study. And we're going to be looking at some brainteasers, which feature part of the up-and-coming puzzles app that you've co-produced with the Open University and the UK Mathematics Trust.

SALLY CRIGHTON: Yeah, that's right.

KAREN FOLEY: Exciting stuff. So is this all in the app?

KATIE CHICOT: It's not all in the app. We went through a lot of puzzles before we narrowed down on the kind of questions you can gamify. So we're going to go through some quick puzzles that couldn't be gamified, but we think we could still chat about today, which we liked.

SALLY CRIGHTON: Which were our favourite ones.

KATIE CHICOT: Yeah, some of our favourites is what we're going to go through.

KAREN FOLEY: So your favourite puzzles? Now you will see, at home, because I have no access to the internet, I have no time to find out what the answers are to all this, so we're going to have to take your views on them. So you'll find some widgets, which will be popping up in your panel.

Now we're going to go through these in turn, so they'll make sense as we're talking along them. But you'll see there's quite a lot of text there, so we will read through all of those at the

moment. And then you can tell us what you think.

And we'll take your answer for it, because I'm not going to embarrass myself again, guys. [LAUGHS] So what is our first puzzle that we're going to talk through?

KATIE CHICOT: Well, a lot of the puzzles that we look at have some sort of reveal or surprise element to them. And so the first one is a simple geometry question. I think it's simple to state.

So if you had a string, right around the Earth, and it has a certain length, how much bigger would you need to make that string so that a mouse, say, about 2 centimetres high, could just squeeze under the rope. So how much bigger would that string need to be?

So you get this idea that you've got quite a lot more string there. So we've set it as a question for the viewers.

KAREN FOLEY: I know what they're going to say. This is a proportionately large mouse.

[LAUGHTER]

And some of our more astute people will be asking about whether this is just a diagram or real. But you're asking about an actual mouse size.

KATIE CHICOT: Just 2 centimetres, you need to just add 2 centimetres to the radius, if we're going mathsie, so that mouse can squeeze underneath.

KAREN FOLEY: So the answers a choice of approximately 6,000 kilometres, 6,000 centimetres, 13 centimetres, or 43,000 kilometres.

KATIE CHICOT: Yeah. So what sort of idea of size do you think we're adding to it, to make that string bigger, all the way around the Earth.

KAREN FOLEY: Well, let's see what our students said, shall we?

KATIE CHICOT: I don't know if -

KAREN FOLEY: 50% said 43,000 kilometres.

KATIE CHICOT: OK, it's going to be huge.

KAREN FOLEY: It's changing.

KATIE CHICOT: It should be big, don't we?

KAREN FOLEY: Yeah, I think so. I mean the Earth is huge, isn't it? Although, a mouse is small.

KATIE CHICOT: What we want to know is how much bigger. So not how big, how much bigger it needs to be?

KAREN FOLEY: How much bigger?

SALLY CRIGHTON: How much extra?

KATIE CHICOT: But we did have nearly 40% saying 13 centimetres, which is the right answer. And if you don't mind me just writing out just a few strokes of maths, I can show you how.

KAREN FOLEY: How do we work this out?

KATIE CHICOT: So do we remember the circumference of a circle is pi times the diameter?

KAREN FOLEY: Yeah.

KATIE CHICOT: We all on board with that?

[LAUGHS]

KAREN FOLEY: Sophie is.

KATIE CHICOT: And just to make it a little bit simpler, I'm just going to right pi times d, just to make that a little bit quicker. Though we've made the diameter 4 centimetres bigger, haven't we? So the diameter is now whatever it was plus 4. And we just need to multiply all of that by pi. May I put in brackets? All of that, boom, multiplied by pi.

So this may be a bit rusty for some of you, but I hope you'll trust me when I say, well, that's the same as pi times the diameter added to pi times 4. So we had what we had before. And all we add to it is pi times 4. It's a little bit less than 13 centimetres.

So all the way around the Earth, sticking out 2 centimetres on each side, you'd think it should be a lot bigger. More than half of you think it should be like 43,000 kilometres or something. No, it's just another 13 centimetres bigger to get that slack in the string. So a little bit surprising.

KAREN FOLEY: Because normally, at the Student Hub Live, we've had a lot more science and social science

and art students with us. But we've got a lot of science, technology, engineering, and maths students with us today. So they might be very interested in putting mice around the Earth and having problems like this.

But aside from the sort of comical value of doing something like this, why would this be something that you would approach in a logical way as opposed to, I guess, a more heuristic way, which I think is the way that the audience and certainly I had interpreted, thinking it must be massive, because the Earth's massive.

So can you tell us a bit about the importance of logic here and working these things out as you've done?

KATIE CHICOT: Well, I think our intuition serves a certain purpose. But when it comes to actually wanting an answer, you got to put that intuition away. It might give you a feel for things. But, actually, I think, when it comes to maths and when it comes to physics, your intuition is just misguided. It's out of date.

It is useful for day-to-day stuff. It's not useful for looking at cosmic things, like the size of the Earth or the distance between stars. Your intuition has a certain function. And you need to put it away when you're doing science, technology, engineering, or maths. You need to know the actual answer. So we sit down, and we work it out, properly.

KAREN FOLEY: Methodically. Excellent. Now just to sort of return back to this idea of the app, where can people access it? And what sorts of things? You're saying that these are games that you can't digitise or put in an app. What sort of things could they expect to see on this app.

KATIE CHICOT: Well, we're hoping it'll come out at the end of the year. And we believe it's going to be called Perplex. And it's going to be available in the app store. And it's also going to be available on Open Learn, as well.

So the sorts of things are brainteasers, but brainteasers where you could, actually, this game, that we'll do later, we have actually digitised. This is where you can move characters around the screen to see how many journeys they take. Multiple choice, you can digitise. But when you need to think through a long problem, you can't really gameify that.

KAREN FOLEY: Yeah, it's difficult. This idea of brain teasers and apps is really important, especially in terms of like cognitive decline. And people are sort of seeing it as a way of treating various things, as

well as, perhaps, being fun, depending on who you are. [LAUGHS] But why was it important to develop this app? And how are you working alongside the UK Mathematics Trust to develop it?

KATIE CHICOT: Well, first of all, we did want to do it because it's fun. And we know -

KAREN FOLEY: You always say that.

KATIE CHICOT: Yeah.

KAREN FOLEY: [LAUGHS]

KATIE CHICOT: There's a great big fear factor and a great big wall that people see when they see the word "maths." And so we're hoping, when they see the word, "Perplex," they don't feel that big wall.

SALLY CRIGHTON: I think that's true. And the app gives you a way into the problem, because sometimes you just look, and you think, well, I don't know where to start, which is really common in maths. But the app, you can press things, and it helps your thinking to develop.

KAREN FOLEY: That must be really exciting working on. I'm looking forward to that. Shall we go on to the next problem that you've got?

SALLY CRIGHTON: The next problem, I don't know if you want to have a look and see, what our students thought.

KAREN FOLEY: Yeah, we'll show you the widget. So this is you're on a game show. And you're given a choice of three doors. Behind one door is the car, behind the other, goats. Honestly, why you would be in some of these situations? But just let's go with it. That's fine.

So you pick door one. And the host, who knows what's behind the doors, opens another door, say it's number three, which has a goat. He says, do you want to pick door number two? It is to your advantage to switch your choice. Tell us about this problem, then.

KATIE CHICOT: So we want to ask the audience is it, is it to your advantage?

SALLY CRIGHTON: The question is, you have made a decision. And you've made a decision.

KAREN FOLEY: Yeah.

SALLY CRIGHTON: And the quizmaster tells you that behind one of them is a goat.

KATIE CHICOT: Yeah, so he shows you this goat. There we go.

SALLY CRIGHTON: So you've chosen this one. And you know that a goat is behind that one. So the question is, do you stick with your original choice or do you swap? Or does that not matter?

KAREN FOLEY: Why is it to your advantage to switch your choice?

SALLY CRIGHTON: No, that's the -

KAREN FOLEY: Or is it?

SALLY CRIGHTON: That's the question.

KAREN FOLEY: Ah, right, is it to your advantage?

KATIE CHICOT: Let's see what you audience says.

KAREN FOLEY: OK. Well, we've had a look at this. It's fairly mixed in terms of what people think, about whether they think it's yes or no. It's been moving around a bit. But at the moment, 57% say, no, it's not to their advantage to change their choice.

SALLY CRIGHTON: So nearly half and half.

KAREN FOLEY: Oh, it's moving around, yeah. [LAUGHS] But it has been a little bit split. So what is the right answer?

SALLY CRIGHTON: This is the problem that perplexes even mathematicians. And Often people argue about the result, which I will tell you in a moment. Would you like me to tell you -

KAREN FOLEY: Yeah.

SALLY CRIGHTON: - what the solution is? Well, just imagine -

KAREN FOLEY: We want to know the right answer.

SALLY CRIGHTON: - just imagine that you've chosen this door. Now the chances of choice of the car, well, first of all, I should say that the assumption we're making is that people actually want to win the car. Because, actually, a goat might be quite nice.

KAREN FOLEY: Just depends if you're a carnivore or - [LAUGHS]

SALLY CRIGHTON: Exactly. But just for the purposes of this problem, which I'll tell you about. I'll tell you where it came from in a moment. Let's just say you choose a door. You hope the car is behind it. What do you think your chances are? There are three doors. You choose one of them. What are the chances you'll be right?

KAREN FOLEY: 1/3.

KATIE CHICOT: Yeah.

SALLY CRIGHTON: OK.

KATIE CHICOT: Great. Well done.

KAREN FOLEY: [LAUGHS]

SALLY CRIGHTON: Great thinking.

KAREN FOLEY: [LAUGHS]

KATIE CHICOT: You actually do a lot of stats with your psychology.

SALLY CRIGHTON: Absolutely.

KAREN FOLEY: [LAUGHS]

SALLY CRIGHTON: That's totally good.

KAREN FOLEY: [LAUGHS]

SALLY CRIGHTON: So your chances of being right are 1 in 3. So the chances of the car being in the other 2 are, therefore, 2 in 3. So if you stick with the answer that you gave, your chances are still 1 in 3. But if you swap, knowing that the goat is behind 1 of the doors, then your chances are 2 in 3. So your chances of winning the car, if you swap, are doubled.

And that is something that has perplexed people for ages. The problem came from the Monty Hall television show. I think it was called *Let's Make a Deal.* And it started in 1963. And apparently, the quizmaster was very excited about it. And it was excellent television viewing.

And apparently, it was really, really hard to make contestants move from their original choice. Because they thought, no, no, I'm sticking with my original choice. But actually, your chances are 1 in 3, here, 2 in 3 there. This is still 2 and 3. And especially, if you know that that is a goat, it's twice as likely the car is behind that one.

Now, Karen, if that's getting your head in a tangle, that's absolutely fine.

KAREN FOLEY: Phew, because it is.

SALLY CRIGHTON: There have been letters from professors in all kinds of subjects saying, no, we don't believe it. And the big thing is that you have additional information. That's the thing. Because, if you don't know, if you pick that door, and he says, do you want to switch, without any other information, it's OK.

It doesn't matter if you switch or not. But now you know. And this is a massively important thing in probability that very, very, very few people understand. And it's so important in all kinds of areas of society, which is why people should study statistics and mathematics.

KAREN FOLEY: [LAUGHS] It is. But again, it returns to this point about emotions and heuristics, I guess, clouding judgments about what should happen. It's all well and good you're sort of breaking these down. And when you visualise them, it's very easy to say, well, yes, of course, I can see that's 1/3 of the 3 things that's going on there. But there is this emotional element that's attached to things. How as mathematicians, then, do detach that?

KATIE CHICOT: I'm not sure. Like I don't think you need to detach it. Because, to be honest, I probably spent two years getting really cross about this puzzle. I was just like, they're wrong, they're wrong. This is the reason I thought they were wrong, just to make it more cloudy for you. It's like, OK, so you have your 1 in 3 chance there. And you picked your door. And then he says, OK, take this door away. That's a goat. There's a goat behind that door. Now, make a new choice. Are

you going to stick or twist? Well, for me, that's 1 in 2.

KAREN FOLEY: Yeah. Yeah.

KATIE CHICOT: Stick or twist.

KAREN FOLEY: Yeah.

KATIE CHICOT: And I was like, well, it's 1 in 2. There's 2 doors. It doesn't matter what happened before or when I was cross. And I Googled it. And I rowed about it.

SALLY CRIGHTON: It does matter what happened before, of course.

KATIE CHICOT: And then I felt I was in good company, because professors got cross about it, PhDs got cross about it. And the most prolific mathematician of all time, I believe, Erdos, so he got in touch and rowed with the mathematical explanation for it. And only when they showed him repeats, like hundreds and hundreds of simulations of the test, showing that it was better to move did he believed it.

And so exactly what Sally explained is right. And that's what I wasn't getting.

KAREN FOLEY: So they actually went through and did all of these, methodically, and then counted up the number of times that you got a better outcome when you moved?

KATIE CHICOT: I think they did a computer simulation, but yeah.

SALLY CRIGHTON: There's apps. You can Google Monty Hall, and there's lots of apps for it. And often, when I try to explain to students, in tutorials, they've just said, I can't, no. I can see what you're saying, but I don't believe it. So if you run a simulation, lots and lots of times, you can see that, if you switch, you're not definitely going to win the car. But you're much much, much more likely to. And probability is all about in the long run.

KAREN FOLEY: I think probability is one of the hardest things to teach. Sophie, you've been studying maths. What do you think? [LAUGHS]

SOPHIE: This is why I like maths. Because there are definite answers in most things. There are still some very debatable areas. And they've all been abound for quite a while. I mean that's not a new problem.

And to be honest, although there are answers that you can say are definite, you can still argue about that. And I quite like that sort of challenge. And you can still have your opinion in maths. People do you think it's very black and white. But there are still some grey areas.

SALLY CRIGHTON: Yeah, especially when you look at probability problems, which are really, really ticklish ones, even for mathematicians and statisticians to get their head round, so very, very worthwhile studying.

KAREN FOLEY: Lovely. Thank you. Eight shows just talking about cake and going. [LAUGHS]

HJ: I got a bit a lost. No idea. I think there are several of us here that need to take some maths modules to get our heads around this stuff.

[LAUGHTER]

KATIE CHICOT: That's what I think is good about these questions.

SALLY CRIGHTON: It's good, absolutely.

KATIE CHICOT: Because it's frustrating. And it makes you want to understand it. That's what I think the purpose of a puzzle is. You think, that's counter-intuitive. And then, if you're me, you then think, they've done it wrong. So you just sit and worked and worked it, and you think, oh, OK, yes. So it was 2/3 of a chance that I was sat on a goat. So then he takes away, and he shows me the goat. OK, so there's still 2/3 of a chance I'm sat on a goat. So I should go away from that goat.

KAREN FOLEY: Yeah. Let's do the river crossing puzzle now. So you'll see the widget coming up for that. And we want to know about the number of times the raft must cross to get people, now I've done these before.

And I can always like explain them when I've got all the answers there. But I really struggle with these, and partly because I think sometimes I find it really difficult to visualise things. And drawing things down can really help, sometimes.

But we've got this puzzle here. Do you want to explain the puzzle about the raft? It's a very common one.

KATIE CHICOT: Yeah, so this one isn't hard to do. This is one you have to play around with, I think. Just make sure Action Man doesn't fall over. So we've got two adults and two children. And we've got a raft to cross a river. It's Batman's raft.

And the raft can't travel by itself. It has to have somebody in there with it. And it can take the weight of two children, or it can take the weight of an adult and a child, but it couldn't take, for example, both Action Man and Ken. So that's not going to work. Even though Action Man is a really good balancer, it's not going happen.

So we can fit Action Man and a child. There we go.

KAREN FOLEY: At one time.

KATIE CHICOT: At one time, or we can have two children. But the raft can't travel alone. Now, I think, with this one, people should just have a little play around on a piece of paper, yeah? I think you just need to just start drawing it out. Well, who can travel when? What can we do?

KAREN FOLEY: So they've all got to get from one side to the other.

KATIE CHICOT: Yeah. What would you like to do as your first move, Karen? Let's just muck about with it.

KAREN FOLEY: I'd put an adult and a child on. I always do this wrong, though, I must tell you.

KATIE CHICOT: It doesn't matter. You're not doing it wrong.

KAREN FOLEY: Adult and child.

KATIE CHICOT: As long as you do something, then you're doing it right.

KAREN FOLEY: Can you leave the child unattended?

KATIE CHICOT: Yeah, it's not like the goat's in the chair.

KAREN FOLEY: [LAUGHS] Yeah.

KATIE CHICOT: So we take them over. Who are you going to leave at that side?

KAREN FOLEY: The child.

KATIE CHICOT: OK, they can be unattended.

KAREN FOLEY: Then bring the adult.

KATIE CHICOT: OK. So this is our second journey.

KAREN FOLEY: Yeah, two again.

KATIE CHICOT: Oh, he can stay on, I suppose.

KAREN FOLEY: I'd keep the adult on and then put the child, yeah.

KATIE CHICOT: OK.

KAREN FOLEY: Put the child on, back.

KATIE CHICOT: So off we go now. This is three.

KAREN FOLEY: This is all very easy. And I'm going to trip up here. I haven't done this. OK, then I drop the adults off, take the child back.

KATIE CHICOT: This is four.

KAREN FOLEY: And then take the adult.

KATIE CHICOT: OK, we've done it in five. And I don't think we could do it any quicker.

KAREN FOLEY: That was too easy. What did everyone else at home think? The choices were 3, 5, 7, 9, and 11. It's all going to change now, I bet you. 60% said 5. Was that the right answer.

KATIE CHICOT: Yeah, 5 was the right answer. We can't get there any quicker, because somebody always has to go back with the boat. So we're only taking one person across at a time, really, and there's four of them. And then on the last journey, we can get the two of them back across.

KAREN FOLEY: It's a lot easier if they're not eating each other. That one with the cannibals is very difficult.

KATIE CHICOT: Who can you leave when?

KAREN FOLEY: But let's do another one, because we're running out of time. How many of these statements are true?

KATIE CHICOT: This is just a straightforward thinking one, OK? Right, so you need to have the statements in front of you. Now just read out the statements. So how many of these statements are true?

You got four statements to read out. Can I read them for you?

KAREN FOLEY: Yeah.

KATIE CHICOT: So it can either be, none of these statements are true, exactly one of these statements is true, exactly two of these statements are true, or all of these statements are true.

KAREN FOLEY: OK, have you got the statements?

KATIE CHICOT: Those are the statements.

KAREN FOLEY: OK. OK, I'm not doing very well. [LAUGHS]

KATIE CHICOT: This is hard, yeah?

SALLY CRIGHTON: This is the last puzzle.

KATIE CHICOT: So we've got four statements.

KAREN FOLEY: I get it.

KATIE CHICOT: So we're just going to attack the first one. The first one says, none of these statements are true. OK, now -

KAREN FOLEY: That's not true.

KATIE CHICOT: Because?

KAREN FOLEY: Another one will be.

KATIE CHICOT: Why would one of the others be true? We don't know yet.

KAREN FOLEY: OK.

KATIE CHICOT: Yeah, but think about it.

KAREN FOLEY: [LAUGHS]

KATIE CHICOT: But listen to this. Think again, right?

KAREN FOLEY: Yeah.

KATIE CHICOT: So it says, none of these statements are true. So if it's false, something's true. But if it's true, then everything has to be false.

KAREN FOLEY: (WHISPERING) Can you guys Google this for me, please, and then put the answer in the widget.

KATIE CHICOT: So this is the best one. This is the one I like best. So if we make the statement, none of these statements are true, in order for that to be true, everything has to be false, including itself. So in order for it to be true, it has to be false. So it can't be true. Get it?

KAREN FOLEY: Are we crossing that one off then?

KATIE CHICOT: Yeah, cross.

KAREN FOLEY: [LAUGHS]

KATIE CHICOT: It's like saying, I am bigger than myself, you know it's just something that can't be. You can't be bigger than yourself. You can't make yourself false.

KAREN FOLEY: Good, so I was right about that.

KATIE CHICOT: Yes. So it's not the case that none of these statements are true. Phew. Right. Similarly, jump to the last one, all of these statements are true.

KAREN FOLEY: Yeah. I don't agree with that either.

KATIE CHICOT: No, because we just said that the first one isn't.

KAREN FOLEY: Yeah. Hang on, let's just see what everyone else thinks before you tell us the answer.

KATIE CHICOT: Yes, OK.

KAREN FOLEY: Hang on.

KATIE CHICOT: Because the question is, is it one or two now? So you've crossed out two.

KAREN FOLEY: Exactly, you've binned the options. So you got 50-50. Oh, 1, 68%, 65%, 69%, moving a lot. Right, 69% say 1.

KATIE CHICOT: We're leaning towards one, now. So everybody who listened to us -

SALLY CRIGHTON: It's pretty impressive.

KATIE CHICOT: Yeah, everyone who listened to us having the little tussle over 0 should now change their choice.

KAREN FOLEY: OK.

KATIE CHICOT: Right, so could it be the case that exactly two of these statements are true?

KAREN FOLEY: No, because one might be true.

KATIE CHICOT: Because?

KAREN FOLEY: Well, two or one can't be true.

KATIE CHICOT: Exactly. Because you can't be both two of them are true and one of them is true.

KAREN FOLEY: [LAUGHS]

KATIE CHICOT: So we can only use the statement, exactly one of these statements is true. So it's one.

KAREN FOLEY: So it's one.

KATIE CHICOT: Yay.

KAREN FOLEY: Whoo! Well done, everybody. That's very good. All right, lovely. Are those all the maths problems that we've got to sort out today?

KATIE CHICOT: Yes, that's fine. We can talk to you, generally, about maths problems, but that's all I was going to test you on. [LAUGHS]

KAREN FOLEY: Well, I'm pleased. That wasn't too bad, actually, in all seriousness. But, honestly, the way you guys teach maths is really interesting. And it's not just about numerical things. It's a lot to do with logic. So tell us about why you both like teaching maths so much and what students can look forward to if they were studying maths with us?

KATIE CHICOT: I'll let you go first, Sally.

SALLY CRIGHTON: Well, there's lots of different things. There's studying maths with us, which you can do. And you learn all about mathematical things and different ways of thinking about mathematical

things and realising that mathematics is part of everything we do.

I mean that's essentially why it's really important that lots of people begin to get confidence, in seeing they can do mathematics and also studying statistics, because, as you know, Karen, statistics plays a massive part in what you do and, increasingly, in what everybody does.

And there are so few statisticians, in the world, at the moment. So studying either mathematics or mathematics with a bit of statistics is pretty much a good thing to do. Lots of people are a wee bit scared about it. Like you're saying, oh, goodness me, don't ask me to do these problems. But actually, when you start, you think, OK, I can do this.

KAREN FOLEY: Yeah.

SALLY CRIGHTON: And we just want to help people do that. And It's just fantastic.

KAREN FOLEY: Well you two do make it more enjoyable. [LAUGHS] What about you?

KATIE CHICOT: Well, yeah, so for me, I think one thing that our students should enjoy is the challenge, because it's quite nice to stretch yourself and give yourself a bit of something to work against. I think they should enjoy really thinking, really like working their brain muscles.

I think they should get used to, this is not what you're going to get out of it, but I think you should get used to making mistakes. Because once you embrace those mistakes, you find you can go anywhere.

Just let yourself make a few mistakes, and just get on and persevere, and then you'll really start to enjoy your mathematics. And then you'll get the reward at the end, which is your own satisfaction, as well as any sort of boost for your career you might need.

KAREN FOLEY: Sally and Katie, thank you so much. Sophie and HJ, what do you think?

HJ: Well, I'm still a bit lost, but it seems as if Julie and Libby are right on it. So I said to them, if I have any maths problems, I know who to go to.

[LAUGHTER]

SALLY CRIGHTON: Come to me.

[LAUGHTER]

HJ: Well, I'll pop off with you, and you can help me with some maths problems. Shall we do that?

SALLY CRIGHTON: Yes.

[LAUGHTER]

SOPHIE: Yeah, I think people really enjoyed it actually more they thought they would. I think they were a little bit dubious about the maths challenge. But for me, obviously, I really enjoyed it, because I'm a bit of a maths geek.

[LAUGHTER]

KAREN FOLEY: Lovely. Excellent. Thank you, both. And thank you for participating in the maths challenges and for doing so well. I'm very, very impressed. And thank you, both, as I've said before, for coming along.

Well next, we're going to have a little break. We're going to watch some prerecorded material, which was from our Bootcamp 1, which is about navigating the virtual learning environment, with Georgina Blakeley. So that's available on the Catch Up if you haven't managed to access it.

But we're going to play it for now. And you can chat, as well, while that's going through. But we won't be interspersing your comments in the studio, because I'm going to get ready for a cocktail party. Because the Open programme are bringing lots of alcohol into the studio, so I'm very excited about that.

So I'll be back in half an hour. Enjoy the Bootcamp session, with Georgina, about navigating the virtual learning environment. It's a really important thing that you need to be able to do especially if you're a new student. And we'll see you very, very soon for a session with the Open Programme.

[MUSIC PLAYING]