

**ENQUIRING MINDS**  
**EQM EP 6 SEG 1**

GIRL: When I grow up...

BOY: I would like to be an animator.

GIRL: A marine biologist.

GIRL: An artist.

BOY: A forensic scientist.

GIRL: A zoo keeper.

GIRL: I want to be a photographer.

BOY: A chef.

GIRL: An author.

BOY: Teacher.

BOY: A surfer.

BOY: Video game designer.

GIRL: A doctor.

GIRL: A fashion designer.

BOY: A builder, cartoonist or stunt man.

VOICE-OVER: Join our reporters as they check out some great jobs, meet interesting people, and go on some cool adventures. Enquiring Minds shows you that you can have fun while following your dreams through higher education.

BEC: Hi and welcome to the show. On this episode – Lockie and Annie trek into the salt marshes to meet a real life batman. But first up, Sacha and Gemma hang out with a group of kids who are making some really clever robots.

SACHA: When most of us hear the word robot we instantly think of sci-fi movies and TV shows yet robots are actually all around us, everything from the radio-controlled cars to your parent's dishwasher is actually a type of robot. Sixth grader Gemma would like to be an engineer when she grows up and she might be a little bit surprised when she finds out that some engineers actually like to build robots. So Gemma, what exactly do you like about engineering?

GEMMA: Well, I like building stuff and I like creating new stuff.

SACHA: What kind of stuff do you create?

GEMMA: I built the cubby house.

SACHA: Are you serious?

GEMMA: Yep.

SACHA: Can you show it to me? I'd love to see it.

GEMMA: Okay. I was about 9 when I built it with my dad.

SACHA: Yep.

GEMMA: My brother did a bit as well.

SACHA: It's really awesome. Can I check it out?

GEMMA: Yeah, sure.

SACHA: Yeah? This is really cool. Do you come up here much?

GEMMA: Yeah, sometimes with my friends.

SACHA: Yeah, what do you do?

GEMMA: Gossip.

SACHA: Gossip, that's the way. And so Gemma, what kind of stuff do you like to do at school?

GEMMA: At school I like science and art.

SACHA: Yep, and what is it about science and art that you like?

GEMMA: I like creating new stuff in art and with science I just like doing some of the experiments.

SACHA: You said something about creating stuff in terms of engineering?

GEMMA: Yep.

SACHA: Did you know some engineers actually like to build robots?

GEMMA: Do they?

SACHA: Yeah, absolutely. Do you want to find out more about it?

GEMMA: Yeah, sure.

SACHA: Let's go.

MICHAEL: My passion for engineering probably relates back to the time of the Apollo moon landings. I was just a little kid back then and the magic of this machine taking people to another world was just too much for a little kid to handle so it sort of lighted a fire under me for what's turned out to be the rest of my life and made me really excited about science and technology.

SACHA: Michael.

MICHAEL: Hey, Sacha.

SACHA: How are you?

MICHAEL: I'm doing well.

SACHA: Michael, I'd love to introduce you to Gemma.

MICHAEL: Gemma, hi, how are you doing?

GEMMA: Good.

MICHAEL: Good.

GEMMA: What kind of robots are you building?

MICHAEL: Well we're building all sort of robots. Right now over here Fred is building a couple of smaller robots called First Tech Challenge robots and over here James and Steph are building some bumpers for a larger robot for what we call the First Robotics Challenge.

SACHA: What is the purpose of these robots?

MICHAEL: Well the purpose of the robots that we're building here are really just for fun and to get kids excited about science and technology more than anything.

SACHA: And Michael, can you possibly give us some examples of an everyday robot?

MICHAEL: Yesterday I took the family to get the car washed and the car wash is automated, your car sits there and the car wash goes up and down around your car and even finds the contour of your car and that's an amazing robot. So there's really robots all around and sometimes people don't even think about it. So I want to show you a few things over here.

GEMMA: Okay.

MICHAEL: Robots are all around us and robots are nothing more than we would typically call automation. When we take things that are mechanical and we combine them with things that are electrical and we have

software controlling both things that's technically a robot. So I want to introduce you to a couple of friends of mine over here. These are the KookaGum Joeys and their coach Sarah.

GEMMA: How do you design and build a robot?

SARAH: So one of the tools that the girls use when they design and build their robot is something we call the design cycle and what that does is it lets the girls identify a problem and then they have to brainstorm solutions to fix that problem. And once they do that they come up with some ideas through that process, don't you girls?

GIRLS: Yeah.

SARAH: And then they build those ideas and then they test it.

SACHA: So Sarah, what kind of tools and equipment do you use to actually build these robots?

SARAH: So the robots that these girls built are made out of Lego. So this whole robot, everything that you see is a Lego part and some of it looks like the Lego that we played with growing up as kids, right, but Lego's grown a bit more sophisticated and we now have microprocessors and motors and sensors built into those.

SACHA: So do you actually program that robot?

GIRL: Yeah.

GIRL: We have to program it on the computer to do different things.

SACHA: And is it easy or hard to program?

GIRL: Sometimes it can be really easy but sometimes it's hard depending on what you're doing.

SACHA: And that's the fun of it, isn't it?

GIRL: Yeah.

SARAH: And that's where the design cycle comes in because every time it doesn't work they have to come up with the solution.

SACHA: And so you ladies love maths and science?

GIRLS: Yeah, we love it.

SACHA: That's incredible.

SARAH: So what we have for you to do today is I have one of the kits here that we take out to schools and there are instructions and enough parts in there that you can make a Lego robot today.

GEMMA: What do you love most about building robots?

SARAH: I like building robots for a variety of reasons. It may not seem like it but little things like this can lead to bigger things and those bigger things can end up changing the world and that's something that I think's really powerful. Having a job some day that you know you're going to make an impact on the rest of humanity.

GEMMA: What sort of competitions do the robots go in?

SARAH: We have all different levels of competitions from Lego robots for our students aged 9 through to 16. We have a middle program called First Tech Challenge which have slightly bigger robots all the way up to the First Robotics competition which is what you're going to be helping with later on so those are really big robots.

GEMMA: We're done.

SARAH: So now that you've built this robot let's go see what the girls are up to and maybe we can get your robot to do something like what they do.

SACHA: And so Sarah, how do you actually talk to these robots? How do you actually get them to do what you want them to do?

SARAH: Well obviously just speaking to them in English doesn't quite work so we have to speak to them in their own language. So what we speak to them normally in is a language that was developed specifically to help children learn to how to program and it's called NICJ and Lego developed it along with the kit. And that's what these girls have used to program this robot. So this year everything that the robot does is somehow or another related to food safety. Those things that it just picked up those are germs and this truck here has got fresh produce from the farm and the girls are trying to get it back to this square which is called base because that's the only place that they can touch their robot. And so they have to get the truck back to base and they got it almost there last time. And this time they did it get there as well. See, girls, you got it in. So now that you've seen all the challenges that the girls did I have got a challenge specifically for you guys. So we have the fish here, we have three adult fish and then we have the tiny baby fish. You guys need to get the three adult fish back to this square

which is called base but this little fish he's obviously much tinier, he's a baby fish and because of the environmental impact we need to make sure that he stays in the ocean. Now this is obviously your challenge. So if we go back to the design cycle that we talked about earlier, the first step was to identify the problem. I've kind of done that for you guys here. So now the second step is to brainstorm solutions.

GEMMA: I think we should take all the four fish back and then put the little baby one back.

SACHA: So basically bring all of them in and then put the other one back out?

GEMMA: Yep.

SACHA: Okay, we can do that.

SARAH: I think it's a good strategy.

SACHA: Awesome, let's try that then.

MICHAEL: Once you know what the problem is you have to solve, you know what the robot needs to do then you can sit down with that maths, that physics, that knowledge of materials and you can actually go and solve that problem. The biggest satisfaction getting the robot built is the first time you turn it on and it simply drives. Everything else on top of that is just icing on the cake but the first time you turn that robot on and it moves, that's a magical moment.

SACHA: It will work, let's just try one more time.

So Gemma and I have learnt how to build a basic Lego robot and

today we're at the Rebound Rumble. A competition where teams battle it out in games of extreme basketball.

SARAH: So Sammy and Catherine are competing here today with our robot, they're team numbers 51, 52.

SACHA: How did you get involved with all this?

CATHERINE: Well I've been involved with the junior robotics program at my school and then a couple of older students from my school are like hey, we need people so let's go there to find people.

SAMMY: Ah, yes, so you got recruited.

SACHA: So you're recruited.

CATHERINE: Yes. I thought it was the greatest thing ever and it's just so much fun.

SACHA: Really?

SAMMY: Every year it's different and that we only have about a month and two weeks to build the whole thing.

SACHA: And to do all the programming?

SAMMY: Yes, everything.

SACHA: How do you do that?

SAMMY: 9 to 5 every single day, all the holidays.

CATHERINE: And the great thing about the team is we're not just a team, we're a family.

SAMMY: Oh yes.

CATHERINE: I've only been on the team for nine months and already I feel like I'm one of them.

SACHA: That's incredible, that's incredible.

MICHAEL: When you're coming to the engineering party it's definitely a team sport. You may have superstars who are really good at maths or are really good at physics but you also need the people who just have a real love of problem solving and they may not be so good at maths or physics or understand how to drill holes in things but they just have a love of solving that problem and often times they're the best engineers on the team.

ALL: (Sings) In history's page let every stage advance Australia Fair.

GEMMA: Why are these competitions so important to young engineers?

MICHAEL: Well engineering is not just about learning a lot of things, it's about doing a lot of things as well. So one of the great things about this competition is that the students actually get to do and to do it in a setting that's very realistic - a lot of pressure, a lot of limitations that you're going to have if you're going to be an engineer in the real world.

SACHA: That's awesome and so what about the cow hat, Michael?

MICHAEL: Well it's also about fun.

SACHA: Really?

MICHAEL: So my cow hat's all about fun.

SACHA: Hey, guys.

WOMAN: We're trying to change out of the bumpers because we'll be on blue next so there's velcro at the bottom if you can find it.

SACHA: What do you mean you will be on blue? It's like changing sides?

CATHERINE: Yes.

GEMMA: Beside baskets how do you go about scoring points?

WOMAN: So we can score points by balancing on the bridge which isn't easy as you could probably see. It's hard enough just going down that bridge actually.

SACHA: And so, guys, when is your next match?

WOMAN: It's like now.

SACHA: Which is now?

Alright. Wow. Whoo!

MICHAEL: I never thought I'd wind up the places I've been and where I am now when I was at university.

An awesome job, you guys rule.

WOMAN: There were robots moving, there was defence, there was offence.

MICHAEL: Engineering today is as much about the science itself and the maths as it is about just sheer problem solving. So if you really love puzzles, if you really love mysteries but you're not so good at the maths or science there's still a place for you in engineering.

GEMMA: What I found interesting about today is that how they build all these robots in such a short amount of time and what they do with them and what they could do.

SACHA: It looks like Gemma has had a really fun time helping out her team and also learning how to build a robot that shoots basketballs and I'm sure that it's going to give her the spark of inspiration to maybe choose engineering as a career option in the future.

BEC: Coming up – Lockie is joined by Annie who meets someone who spends most of his days and a lot of his nights studying bats.

END OF TRANSCRIPT