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Adding 'girl power' to academic inspiration with SA's Queen of Mathematics

Mathematically gifted, Danielle Kleyn's future is burning bright. She's looking forward to her 2020 Matric year, having just completed her Grade 11 studies at Parel Vallei High School in Somerset West. But her enthusiasm for the year ahead comes as no surprise; her passion and talent for maths has already seen her crowned as 'Queen of Mathematics' twice at the Pan African Mathematics Olympiad (PAMO) and first in her grade for the olympiad for the past four years. Here, Kleyn shares some actionable advi that parents and learners can use to foster their love and talent for maths...

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'Girl power' comes to mind when speaking to Danielle. She's a humble, yet quietly powerful, force who has already proven herself as the only 2019 South African female national medallist of the South African Mathematics Olympiad (SAMO), placing in the top 10 of the senior division of the biggest Olympiad in Sou Africa.

Time for female mathematical ability to shine!

Organised by the non-profit South African Mathematics Foundation (SAMF), the SAMO makes a positive contribution to the critical skills development the country desperately needs to achieve its socio-economic goals. This because SAMF aims to advance the mathematics development and education of South Africa youth through improved quality teaching and learning of mathematics, as well as through public awareness activities.

Professor Kerstin Jordaan, executive director of SAMF, says a highlight of this year's SAMO awards is jus this: Mathematics is a field where women tend to be underrepresented globally, yet there was more divers of winners than ever before – especially in South Africa where gender-based violence has been in the spotlight, it's amazing to see the girls outperform the boys having the confidence compete at the highest levels locally.

Danielle has always excelled in maths. She has competed in the third and final round for the top 100 junior and top 100 seniors, and has won the University of Pretoria Maths Competition for her grade group since grade 8. She has also been in the top 10 of her grade group for the University of Cape Town's Maths Competition since grade 9, and received its 'top girl award' in grades 9 and 11.

Danielle's name is also known in wider circles, as she represented SA at the 2018 and 2019 Pan African

Mathematics Olympiad (PAMO). Her excellent results at PAMO saw her further recognised as one of only three girls in the country to receive South African colours for her international maths Olympiad participatior 2018.

From fun primary school activity to twice staking a rigorous regal title

Danielle also went on to win the title 'Queen of Mathematics' for the second consecutive time in 2019, confirmation of the hard work she's put in to come this far. While she doesn't usually mention her title to people herself unprompted, they find out through her mom's excited storytelling, which results in lots of impressed compliments!

Explaining her path to success, the keen mathematician says she loves to solve tricky problems by workin with data, quantity, structure and variables. She started participating in olympiads in primary school, where she excelled at what she saw as a fun activity. On starting high school, she realised she could compete more competitively and started preparing more diligently.

Parel Vallei's Maths teachers acknowledged her enthusiasm and talent for Maths by introducing her to the SAMO in grade 8, which roughly 90 000 high school learners across the country participate in annually. Th SAMO consists of three separate rounds for Juniors (grades 8-9) and Seniors (grades 10-12), each writte months apart from each other to improve learners' problem-solving skills and make mathematics a more approachable subject.

Danielle did so well in her first year of participation that she was also chosen for the Boland Junior A-team 2016. She went on to become one of the top 20 juniors in SAMO that year, claiming overall third spot in th Western Cape based on her SAMO second round results.

By then, her Olympiad appetite was well-fed and she was hungry for more. And so it's no surprise that the following year she was reselected for the Boland Junior A-team and ended up seventh overall in the third round for juniors at SAMO, while also claiming top spot in the Western Cape after achieving full marks.

In Grade 10, she placed 15th and was the top girl for seniors in the third round, while she placed fourth overall for seniors in the third round in Grade 11. She also received a silver runner-up medal for her SAMC success at the 2019 SAMF awards earlier in the year.

How school initiatives ensure a brighter future for all

Danielle's success in this regard is especially heartwarming for the South African Institute of Chartered Accountants (SAICA), which co-sponsors SAMO as part of its school initiatives as part of its social contribution to improving quality education for all.

Danielle too has a heart for society as she works towards helping meet the UN's Sustainable Developmen Goal (SDG) of ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all by helping her fellow students succeed, giving freely of her time to help them prepare Maths Olympiads and offering extra Maths lessons.

This giving-back spirit is crucial for the future of the country, as studies show that in one out of four countrie more than half the children fail to meet minimum mathematics proficiency standards at the end of primary school, with more than half of those female. It's only when quality education is offered that we can break away from the cycle of poverty and reach gender equality.

Speaking about why it's important to her to help her fellow students succeed, Danielle acknowledges that's she's been fortunate to have attended extra maths classes and has very supportive mentors. She enjoys helping by providing extra resources she wishes she had when she was younger. There's an added bonus doing so, as explaining the problems also helps her get a clearer idea of them, confirming her own experience of excelling at maths.

Unleashing the creativity of Matric maths and beyond...

People often ask about Danielle how she prepares for mathematics Olympiads. She says it differs depending on the Olympiad, and how much time she has available to prepare – she has much less time to do so now than compared to when she was in the junior high school grades. Understandably so, as her Matric year will comprise a well-rounded mix of subjects, ranging from Afrikaans and English Home Language to Mathematics, Life Orientation, Information Technology (IT), Physical Sciences, and Design.

Yet Maths Olympiads equip you with more than just numeric skills. They also teach you to be creative and understand the thought-process of problem-solving, not to simply memorising work parrot-fashion. While creativity isn't often associated with mathematics, Danielle says discovery and progress in maths often means using what's already known, then applying it in an unconventional way. Unfortunately, school mathematics is often taught to be used in a "mechanical and boring" way, which differs from Danielle's conception of it.

Her own personal process also differs from the norm as she says her most important drive comes from internal motivation – of challenging yourself with more advanced problems, and reminding yourself of sma victories rather than from others' acknowledgement of her achievements.

Tips for grooming the 'Queen of Mathematics' of the future...

If you'd like to groom your own future 'Queen of Mathematics', Danielle says parents can help their childre prepare by going through old exam papers and problems from competitions in other countries often found on the internet, as these give you a feel for the type of questions asked. If she finds a specific formula or technique useful, she makes a note of that.

Competing in Olympiads has taught Danielle to be patient with herself, as it's often not possible to solve th problem in a short time. When the solution just won't come, Danielle switches focus to another category o reads through the problem's solution rather than forcing herself to work on it, as she says, "that removes th fun and creates a negative association".

Clearly wise beyond her years, Danielle's mathematical aptitude means she's planning to study Mathemati Applied Mathematics and/or Computer Science at Stellenbosch University after matric. While she doesn't plan on becoming a CA(SA) at this stage, she says any profession would greatly benefit if future candidate weren't held back by inequality, and allowed to be in an environment where they can reach their full acaden potential.

Danielle is certainly proof of that, and we look forward to hearing of her future successes.

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