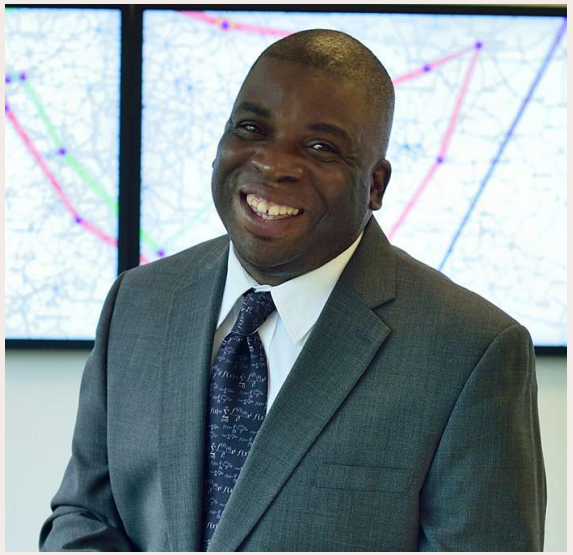
Dr. Nira Chamberlain: A Trailblazer in Mathematics

Dr. Chamberlain showed a strong love for mathematics from a young age despite facing discouragement from educators.

His determination led him to pursue higher education and earn a PhD in mathematics.

He overcame societal and institutional barriers, becoming a prominent Black scientist in mathematics.

His journey stands as a powerful example of perseverance and dedication leading to success.



Career Milestones

Named among the UK's top 100 scientists by the Science Council for significant field contributions.

First Black President of the Institute of Mathematics and its Applications in 2020, marking a historic milestone.

Featured in Powerlist 2021 as one of the 100 most influential Black Britons for STEM and diversity impact.

Leadership and achievements highlight commitment to excellence and inspire future mathematicians.

Real-World Applications

Dr. Chamberlain develops mathematical models that solve complex, real-world challenges in various fields.

His models improve military logistics efficiency by optimizing resource allocation and operational planning.

He solved a key naval engineering problem analyzing cost and capability trade-offs for an aircraft carrier.

His work highlights how abstract mathematics translates to practical societal benefits and engineering solutions.

🛠️ Industrial Modelling & Cost Analysis (Inspired by HMS Queen Elizabeth project)

1. Budget Trade-Off Problem The lifetime running cost of an aircraft carrier is estimated at £3.2 billion. If the annual operating budget is £400 million, how many years can the carrier be operated before exceeding the budget?

2. Cost vs Capability Optimization Suppose increasing the capability of a ship by 10% increases its cost by 15%. If the base cost is £2 billion, what is the new cost after the capability upgrade?

3. Pie Chart Interpretation An aircraft carrier's running costs are divided as follows: fuel (40%), maintenance (25%), crew salaries (20%), and miscellaneous (15%). Create a pie chart and calculate the actual cost of each category if the total cost is £3 billion.

🎲 Probability & Networks (Inspired by his PhD on Gambler's Ruin over Networks)

4. Gambler's Ruin Scenario A player starts with £10 and plays a game where they win £1 with probability 0.45 and lose £1 with probability 0.55 per round. What is the expected number of rounds before they go bankrupt?

5. Network Probability Imagine five friends are playing a game. They stand at different points on a map and can pass a token to a friend they're connected to. Each time someone tries to pass the token, there's a 60% chance it works.

If the game starts with one friend holding the token, what's the chance that all five friends have received the token after 3 rounds of passing?

6. Simulation Challenge A gambler moves around a simple map with 4 connected points. Each time they try to move to a new point, there's a 50% chance they succeed.

Describe how you could simulate this using a dice or computer. What patterns might you notice if you repeat the game 100 times?

🌍 Real-World Applications & STEM Careers

7. Career Path Mapping Dr. Chamberlain studied Industrial Mathematical Modelling. Research and list 3 industries where this type of mathematics is used. For each, describe one mathematical concept that might be applied.

8. Diversity in STEM Dr. Chamberlain advocates for diversity in mathematics. Create a bar chart showing the percentage of students studying A-level maths by ethnicity or gender (use hypothetical or real data). What trends do you observe?