

2026 Queensland Quantum Challenge - Curriculum Alignment to Australian Curriculum V9 – Mathematical Methods (for Year 11)

The following senior Mathematical Methods Rationale is aligned to the 2026 Queensland Quantum Challenge.

<https://www.qcaa.qld.edu.au/senior/senior-subjects/syllabuses/mathematics/mathematics-methods>

Mathematical Methods Syllabus Rationale

Mathematics is a unique and powerful intellectual discipline that is used to investigate patterns, order, generality and uncertainty. It is a way of thinking in which problems are explored and solved through observation, reflection and logical reasoning. It uses a concise system of communication, with written, symbolic, spoken and visual components. Mathematics is creative, requires initiative and promotes curiosity in an increasingly complex and data-driven world. It is the foundation of all quantitative disciplines.

To prepare students with the knowledge, skills and confidence to participate effectively in the community and the economy requires the development of skills that reflect the demands of the 21st century. Students undertaking Mathematics will develop their critical and creative thinking, oral and written communication, information & communication technologies (ICT) capability, ability to collaborate, and sense of personal and social responsibility — ultimately becoming lifelong learners who demonstrate initiative when facing a challenge. The use of technology to make connections between mathematical theory, practice and application has a positive effect on the development of conceptual understanding and student disposition towards mathematics.

Mathematics teaching and learning practices range from practising essential mathematical routines to develop procedural fluency, through to investigating scenarios, modelling the real world, solving problems and explaining reasoning. When students achieve procedural fluency, they carry out procedures flexibly, accurately and efficiently. When factual knowledge and concepts come to mind readily, students are able to make more complex use of knowledge to successfully formulate, represent and solve mathematical problems. Problem-solving helps to develop an ability to transfer mathematical skills and ideas between different contexts. This assists students to make connections between related concepts and adapt what they already know to new and unfamiliar situations. With appropriate effort and experience, through discussion, collaboration and reflection of ideas, students should develop confidence and experience success in their use of mathematics.

The major domains of mathematics in Mathematical Methods are Algebra, Functions, relations and their graphs, Calculus and Statistics. Topics are developed systematically, with increasing levels of sophistication, complexity and connection, and build on algebra, functions and their graphs, and probability from the P-10 Australian Curriculum. Calculus is essential for developing an understanding of the physical world. The domain Statistics is used to describe and analyse phenomena involving uncertainty and variation. Both are the basis for developing effective models of the world and solving complex and abstract mathematical problems. The ability to translate written, numerical, algebraic, symbolic and graphical information from one representation to another is a vital part of learning in Mathematical Methods.

Students who undertake Mathematical Methods will see the connections between mathematics and other areas of the curriculum and apply their mathematical skills to real-world problems, becoming critical thinkers, innovators and problem-solvers. Through solving problems and developing models, they will appreciate that mathematics and statistics are dynamic tools that are critically important in the 21st century.

Mathematical Methods Syllabus Objectives

The following Mathematical Methods syllabus objectives align to the 2026 Queensland Quantum Challenge.

4. Evaluate the reasonableness of solutions.

When students evaluate the reasonableness of solutions, they interpret their mathematical results in the context of the situation and reflect on whether the problem has been solved. They verify results by using estimation skills and checking calculations, with and without technology. They make an appraisal by assessing implications, strengths and limitations of solutions and/or models, and use this to consider if alternative methods or refinements are required.

5. Justify procedures and decisions.

When students justify procedures and decisions, they explain their mathematical reasoning in detail. They make relationships evident, logically organise mathematical arguments, and provide reasons for choices made and conclusions reached.

Mathematical Methods Unit/Syllabus Objects and Subject Matter

The Unit/Syllabus Objectives and Subject Matter included provide connections applications of quantum and advanced technologies in the 2026 Queensland Quantum Challenge.

Mathematical Methods	
Unit / Syllabus Objectives	Subject Matter
Unit 1: Surds, algebra, functions and probability	<ul style="list-style-type: none"> • Topic 1: Surds and quadratic functions • Topic 2: Binomial expansion and cubic functions • Topic 3: Functions and relations
Unit 2: Calculus and further functions	<ul style="list-style-type: none"> • Topic 1: Exponential functions • Topic 2: Logarithms and logarithmic functions • Topic 3: Introduction to differential calculus • Topic 4: Applications of differential calculus • Topic 5: Further differentiation.
Unit 3: Further calculus and introduction to statistics	<ul style="list-style-type: none"> • Topic 1: Differentiation of exponential and logarithmic functions • Topic 2: Differentiation of trigonometric functions and differentiation rules • Topic 3: Further applications of differentiation