**STAGE 6 MATHEMATICS 2/3 UNIT TOPICS**

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| **TOPIC** | **2 UNIT COURSE** | **3 UNIT COURSE** |
| Basic Arithmetic and Algebra | Basic number | Inequalities with unknown in denominator |
| Surds |  |
| Absolute value – evaluation, equations, inequalities |  |
| Basic algebra |  |
| Factorising |  |
| Equations – basic, quadratic, simultaneous |  |
| Inequalities – linear, quadratic |  |
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| Plane Geometry | Angles |  |
| Parallel lines |  |
| Triangles |  |
| Quadrilaterals |  |
| Congruency |  |
| Similarity |  |
| Pythagoras’ theorem |  |
| Areas |  |
|  | | |
| Functions and Relations | Function notation |  |
| Domain and range |  |
| Sketching functions |  |
| Even and odd functions |  |
| Sketching regions involving inequalities |  |
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| Circle Geometry |  | Arcs and cords |
|  | Angle properties |
|  | Chord properties |
|  | Cyclic Quadrilaterals |
|  | Tangent properties |
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| **TOPIC** | **2 UNIT COURSE** | **3 UNIT COURSE** |
| Differentiation | Limits |  |
| First principles |  |
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| Product rule |  |
| Quotient rule |  |
| Functions of a function rule |  |
| Gradients of tangents and normals |  |
| Equations of tangents and normals |  |
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| Trigonometry | Right angled trigonometry | Sum and difference formulae |
| Reciprocal ratios | Double angle formulae |
| Complementary ratios | t-formulae |
| Exact values | Complicated equations |
| Angles of any magnitude |  |
| Sine rule |  |
| Cosine rule |  |
| Area of a triangle |  |
| Pythagorean identities |  |
| Trigonometric ratios |  |
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| Quadratic Functions | Sketching quadratics |  |
| Quadratic functions – by factors, by formula, by completing the square |  |
| Discriminant |  |
| Roots of quadratic equations |  |
| Quadratic identities |  |
| Equations reducible to quadratics |  |
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| Coordinate Geometry | Distance formula | Angle between two lines |
| Gradient formula | Dividing interval in given ratio |
| Midpoint formula, m = tanƟ |  |
| Equations of straight lines |  |
| Parallel and perpendicular lines |  |
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| **TOPIC** | **2 UNIT COURSE** | **3 UNIT COURSE** |
| Polynomials |  | Definition of polynomial |
|  | Graphing polynomial |
|  | Remainder and factor theorem |
|  | Relationship between coefficients and roots |
|  | Determining roots by halving the interval |
|  | Determining roots by Netwon’s Method |
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| Parabola | Locus | Parametric form of parabola |
| Parts or parabola | Equations of tangents and normals |
| *x*2 = 4*ay* | Equation of chord of contact |
| (*x – h*)2 = 4*a* (*y – k*) | Locus problems |
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| Geometric application of Differentiation | Significance of f’(x) and f” (x) | Curve stretching with curves with asymptotes |
| Sketching derivative curves |  |
| Stationary points |  |
| Increasing and decreasing curves |  |
| Concavity |  |
| Inflexion points |  |
| Curve sketching |  |
| Maxima and minima problems |  |
| Primitive functions |  |
|  | | |
| Series and their Applications | Indices | Mathematical induction |
| Logarithms |  |
| Definition of term, nth term, sum to n terms, sigma notation |  |
| AP’s |  |
| GP’s |  |
| Limiting sum |  |
| Problems with AP’s and GP’s |  |
| Repeating decimals |  |
| Compound interest |  |
| Superannuation |  |
| Time payments |  |
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| **TOPIC** | **2 UNIT COURSE** | **3 UNIT COURSE** |
| Integration | Trapezoidal rule | Integration by substitution |
| Simpson’s rule |  |
| Indefinite integrals |  |
| Definite integrals |  |
| Area under curves |  |
| Volumes of revolution |  |
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| Trigonometric Functions | Radians | Integration |
| Arc length | Solving harder trigonometric equations |
| Area of sector | Integration involving double angle formula |
| Area of minor segment |  |
| Graphics of trigonometric functions |  |
| Differentiation of trigonometric functions |  |
| Integration of trigonometric functions |  |
| Area of volumes involving trigonometric functions |  |
| Solving trigonometric functions |  |
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| Exponential and Logarithmic Functions | y = ex |  |
| Graphs of exponential functions |  |
| Differentiation and integration of exponentials |  |
| Areas and volumes involving exponentials |  |
| y = logex |  |
| Graphs of logarithmic functions |  |
| Differentiation of logarithmic functions |  |
| Integration of functions resulting in log functions |  |
| Area and volumes involving log functions |  |
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| Inverse Functions |  | Inverse functions |
|  | Graphs of inverse functions |
|  | Inverse trigonometric functions |
|  | Differentiating inverse trigonometric functions |
|  | Integrals involving inverse trigonometric functions |
|  | Areas and volumes |
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| **TOPIC** | **2 UNIT COURSE** | **3 UNIT COURSE** |
| Binomial Theorem |  | Pascal’s triangle |
|  | Properties of combinations |
|  | Expanding binomial products |
|  | Relationship between binomial coefficients |
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| Probability | Simple events | Permutations |
| Complementary events | Combinations |
| Product theorem | Permutations and combinations and probability\*\* |
| Addition theorem | Probability using binomial theorem\*\* |
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| Application of Calculus to the Physical World | Rates of change\* | Motion as derivatives or integrals relating to x |
| Exponential Growth and Decay\* | Simple harmonic motion |
| Motion as derivatives or integrals relating to time\* | Projectiles\*\* |
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| Note: sections with \* will be tested in the Extension 1 paper for the trial examination  \*\*will not be tested in the trial examination | | |