

## Accelerated Precalculus 2015–16

<b>Unit</b>	<b># of weeks</b>	<b>Topics</b>	<b>Resources</b>
1. The Algebra and Analysis of Elementary Functions	4	Intensive algebra camp, transformations of parent functions, composition of functions, inverses, polynomials and real roots, even/odd, end behavior, exponential and logarithmic functions	<i>AoPS</i> 1.1, 1.2, 1.3, 1.4, 1.5 <i>UCSMP</i> 2-1, 2-4, 2-5, 2-6, 3-1, 3-2, 3-6, 4-4 <i>AM A7</i> , 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 4-1, 4-2, 4-3, 4-4, 4-5, 4-7, 5-1, 5-2, 5-3, 5-5, 5-6, 5-7
2. Periodic Functions	4	Graphs and transformations of all six trigonometric functions, proving trigonometric identities, inverse trigonometric functions, solving trigonometric equations, modeling sound with sinusoidal functions, general periodic functions	<i>AoPS</i> 2.3, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 <i>UCSMP</i> 2-9, 5-7, 5-8, 5-9 <i>AM</i> 4-4, 7-4, 7-5, 7-6, 8-1, 8-2, 8-3, 8-4, 8-5, 10-1, 10-2, 10-3, 10-4
3. Polar Graphs	2	Correspondence between parametric, polar, and rectangular coordinates, graphing polar functions, rose curves and spirals, conic sections using polar coordinates	<i>AoPS</i> 5.2, 5.4 <i>UCSMP</i> 8-2, 8-3, 8-4, 8-5 <i>AM</i> 11-1, 12-3
4. Complex Numbers	2	Complex number arithmetic, complex roots of polynomials, fundamental theorem of algebra	<i>AoPS</i> 6.1, 6.2, 6.3, 6.4, 6.5 <i>UCSMP</i> 9-5, 9-6 <i>AM</i> 1-5, 2-7
5. The Complex Exponential Function	3	Geometry of complex numbers, representation of complex multiplication as rotation matrices, de Moivre's Theorem, complex roots of unity, the number $e$ , Euler's formula	<i>AoPS</i> 7.1, 7.2, 7.3, 7.4, 7.5, 8.1 <i>UCSMP</i> 9-1, 9-2, 9-3, 9-4 <i>AM</i> 5-4, 11-2, 11-3, 11-4
6. Probability and Combinatorics	3	Multiplication counting principle, permutations, combinations, Pascal's triangle, random walks, expected value, binomial and multinomial coefficients, combinatorial proofs	<i>UCSMP</i> 12-1, 12-2, 12-3, 12-4, 12-5, 12-6, 12-7, 12-8 <i>AM</i> 15-1, 15-2, 15-3, 15-4, 15-5, 16-2, 16-3, 16-4, 16-5, 16-6
7. Matrices	3	Sequences of matrices, symmetric, adjacency, weight, stochastic, and transition matrices, steady states	<i>UCSMP</i> 13-1, 13-2, 13-3, 13-4, 13-5, 13-6 <i>AM</i> 14-2, 14-3, 14-4, 14-5, 14-6
8. Recursion, Sequences, and Series	4	Arithmetic and geometric sequences, finite and infinite series, sigma notation, intervals of convergence, explicit formula for the Fibonacci sequence, mathematical induction, orbits of sequences of complex numbers, fractals	<i>UCSMP</i> 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7, 9-7 <i>AM</i> 13-1, 13-2, 13-3, 13-4, 13-5, 13-6, 13-7, 19-5, 19-6
9. Limits	3	Rational functions, asymptotes, discontinuities, limits as sequences, informal delta-epsilon arguments	<i>UCSMP</i> 5-2, 5-3, 5-4, 5-5 <i>AM</i> 19-1, 19-2, 19-3, 19-4
10. Continuity and the Formal Derivative	3		<i>UCSMP</i> 7-1, 7-2, 7-3, 7-4, 7-5, 7-6 <i>AM</i> 20-1, 20-2, 20-3, 20-4
11. Derivative Functions and Their Applications	3		<i>Foerster / Hughes-Hallett</i>

Total weeks = 34