

**Massachusetts State Core Curriculum**  
**Content standards, 2000**

Precalculus	Boardworks Precalculus and Trigonometry presentations
<b>Number Sense and Operations</b>	
PC.N.1 Plot complex numbers using both rectangular and polar coordinates systems. Represent complex numbers using polar coordinates, i.e., $a + bi = r(\cos\theta + i\sin\theta)$ . Apply DeMoivre's theorem to multiply, take roots, and raise complex numbers to a power.	Polar coordinates
<b>Patterns, Relations and Algebra</b>	
PC.P.1 Use mathematical induction to prove theorems and verify summation formulas.	–
PC.P.2 Relate the number of roots of a polynomial to its degree. Solve quadratic equations with complex coefficients.	Polynomials of degree 3 or more The Factor Theorem
PC.P.3 Demonstrate an understanding of the trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent). Relate the functions to their geometric definitions.	The sine, cosine and tangent of any angle Trigonometric graphs and exact values The inverse trigonometric functions The reciprocal trigonometric functions Trigonometric identities using reciprocal functions Trigonometric identities The law of sines and the area of a triangle The law of cosines 3–D trigonometry Questions on trigonometry
PC.P.4 Explain the identity $\sin^2\theta + \cos^2\theta = 1$ . Relate the identity to the Pythagorean theorem.	Trigonometric identities
PC.P.5 Demonstrate an understanding of the formulas for the sine and cosine of the sum or the difference of two angles. Relate the formulas to DeMoivre's theorem and use them to prove other trigonometric identities. Apply to the solution of problems.	The addition formulas The double angle formulas Expressions of the form $a \cos x + b \sin x$ Questions on trigonometry Polar coordinates
PC.P.6 Understand, predict, and interpret the effects of the parameters $a$ , $\omega$ , $b$ , and $c$ on the graph of $y = a\sin(\omega(x - b)) + c$ ; similarly for the cosine and tangent. Use to model periodic processes. (12.P.13)	Transforming functions part 1 Transforming trigonometric functions Trigonometric graphs and exact values Expressions of the form $a \cos x$ plus $b \sin x$

<p>PC.P.7 Translate between geometric, algebraic, and parametric representations of curves. Apply to the solution of problems.</p>	<p>Parametric functions  Parametric equations of curves  Graphing rational functions  Polynomials of degree 3 or more  Plotting and sketching graphs  Piecewise-defined functions  Graphs of important non-linear functions  Graphs of quadratic functions  The equation of a circle  Conic sections part 1  Conic sections part 2</p>
<p>PC.P.8 Identify and discuss features of conic sections: axes, foci, asymptotes, and tangents. Convert between different algebraic representations of conic sections.</p>	<p>Conic sections part 1  Conic sections part 2</p>
<p>PC.P.9 Relate the slope of a tangent line at a specific point on a curve to the instantaneous rate of change. Explain the significance of a horizontal tangent line. Apply these concepts to the solution of problems.</p>	<p>Rate of change  Slopes and intercepts</p>
<b>Geometry</b>	
<p>PC.G.1 Demonstrate an understanding of the laws of sines and cosines. Use the laws to solve for the unknown sides or angles in triangles. Determine the area of a triangle given the length of two adjacent sides and the measure of the included angle. (12.G.2)</p>	<p>The law of sines and the area of a triangle  The law of cosines</p>
<p>PC.G.2 Use the notion of vectors to solve problems. Describe addition of vectors, multiplication of a vector by a scalar, and the dot product of two vectors, both symbolically and geometrically. Use vector methods to obtain geometric results. (12.G.3)</p>	<p>Vectors in two and three dimensions  The magnitude of a vector  Adding and subtracting vectors  Position vectors and coordinate geometry  The dot product  Using vectors  Vector arithmetic  The vector equation of a line  Intersecting lines  The intersection of a line and a plane  Questions on vectors</p>
<p>PC.G.3 Apply properties of angles, parallel lines, arcs, radii, chords, tangents, and secants to solve problems. (12.G.5)</p>	<p>Degrees and radians  Solving equations using radians  Intersecting lines</p>

<b>Measurement</b>	
PC.M.1 Describe the relationship between degree and radian measures, and use radian measure in the solution of problems, in particular problems involving angular velocity and acceleration. (12.M.1)	Degrees and radians Solving equations using radians
PC.M.2 Use dimensional analysis for unit conversion and to confirm that expressions and equations make sense. (12.M.2)	Degrees and radians