
# Mohawk Local Schools Pre-Calculus

## Quarters 3/4 Curriculum Guide

Mathematical Practices

1. Make Sense of Problems and Persevere in Solving them
2. Reasoning Abstractly & Quantitatively
3. Construct Viable Arguments and Critique the Reasoning of Others
4. Model with Mathematics
5. Use Appropriate Tools Strategically
6. Attend to Precision
7. Look for and Make use of Structure
8. Look for and Express Regularity in Repeated Reasoning

**Critical Areas of Focus Being Addressed:**

- Reasoning Abstractly & Quantitatively
- Model with Mathematics
- Make Sense of Problems and Persevere in Solving them

| **Content Statements Addressed and Whether they are Knowledge, Reasoning, Performance Skill, or Product:(DOK1) (DOK2) (DOK3) (DOK4)** | **Underpinning Targets Corresponding with Standards and Whether they are Knowledge, Reasoning, Performance Skill, or Product: "I can….", "Students Will Be Able To……."** |
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| **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. | • Solve right triangles using trigonometric and inverse trigonometric functions. (K) |

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| *Chapter 4* **(DOK2)**<br><br>**F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. *Chapter 4* **(DOK2)**<br><br>**F.TF.3 (+)** Use special triangles to determine geometrically the value of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for x, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number. *Chapter 4* **(DOK2)**<br><br>**F.TF.4 (+)** Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.<br>**F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. *Chapter 4* **(DOK2)**<br><br>**F.TF.6 (+)** Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. *Chapter 4* **(DOK2)**<br><br>**F.TF.7 (+)** Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. *Chapter 4* **(DOK2)**<br><br>**F.TF.8.** Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. *Chapter 4* **(DOK2)** | • Convert between degrees and radians. (K)<br>• Solve real-world problems using trigonometric functions. (R)<br>• Graph trigonometric functions and their inverses. (R)<br>• Solve oblique triangles and find their area using various laws and formulas. (R)<br>• Identify and use trigonometric identities to find trigonometric values. (K)<br>• Use trigonometric identities to simplify and rewrite trigonometric expressions. (R)<br>• Verify trigonometric identities. (R)<br>• Solve trigonometric equations. (K)<br>• Use sum and difference identities to evaluate trigonometric functions. (K)<br>• Use double-angle, power reducing, half angle, and product-to-sum identities to evaluate trigonometric expressions and solve trigonometric equations. (R) |

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| **F.TF.9. (+)** Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems. *Chapter 4* **(DOK2)** | |
| **G.GPE.3 (+)** Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. **(DOK3)** *Chapter 7* | • Analyze, write, and graph equations of parabolas, ellipses, circles, and hyperbolas. (PS)<br>• Use equations to identify types of conic sections. (R)<br>• Use rotation of axes to write equations of rotated conic sections. (R)<br>• Graph rotated conic sections. (R)<br>• Graph parametric equations. (R)<br>• Solve problems related to the motion of projectiles. (R) |
| **N.CN.1** Know there is a complex number I such that i2 = -1, and every complex number has the form a + bi with a and b real. *Chapter 9* **(DOK2)**<br><br>**N.CN.2** Use the relation i2 = -1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. *Chapter 9* **(DOK2)**<br>**N.CN.3 (+)** Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. *Chapter 9* **(DOK2)**<br><br>**N.CN.4(+)** Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. *Chapter 9* **(DOK2)** | • Graph points with polar coordinates. (K)<br>• Graph polar coordinates. (K)<br>• Identify and graph classic polar curves. (K)<br>• Convert between polar and rectangular coordinates. (K)<br>• Convert between polar and rectangular equations. (K)<br>• Identify polar equations with conics. (K)<br>• Write and graph the polar equation of a conic given its eccentricity and the equation of its directrix. (R)<br>• Convert complex numbers from rectangular to polar form and vice versa. (K)<br>• Find products, quotients, powers, and roots of complex numbers in polar form. (R) |

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| **N.CN.5 (+)** Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. (e.g., (-1 + $\sqrt{3}$i) has modulus 2 and argument 120° *Chapter 9* **(DOK2)**<br><br>**N.CN.6** Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints *Chapter 9* **(DOK2)** | |
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