# Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

## Course Name: Precalculus/ Precalculus Honors
## Course Number: 034300/ 034200

## PART I: Unit Rationale
### WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

| Course/Unit Title: **Additional Topics in Trigonometry Chapter 6** Grade Level(s): 10 - 12 | Unit Summary: In this Unit, students learn how to apply trigonometry to oblique triangles, vectors, and complex numbers. They begin the chapter by learning how to find side lengths, angles, and areas of oblique triangles by using the Law of Sines and Law of Cosines. They then study vectors and vector notation, using trigonometry to solve real world problems such as finding force on an incline ramp or a wind-adjusted bearing in airplane navigation. The students will use specific math vocabulary associated with Law of Sines, Law of Cosines and Vectors. |
|---|---|
| Essential Question(s): <br><br> • **How do you use trigonometry to solve and find the areas of oblique triangles?** <br> • **How do you represent and perform operations with vector quantities?** <br> • **How do you write a vector as a sum of two vector components?** | Enduring Understanding(s): <br><br> • Use the Law of Sines to solve oblique triangles.(AAS or ASA) <br> • Use the Law of Sines to solve oblique triangles (SSA). <br> • Find areas of oblique triangles and use the Law of Sines to model and solve real-world problems. <br> • Use the Law of Cosines to solve oblique triangles (SSS or SAS). <br> • Use the Law of Cosines to model and solve real-life problems. <br> • Use Heron's Area Formula to find the areas of triangles. <br> • Represent vectors as directed line segments. <br> • Write the component form of vectors. <br> • Perform basic vector operations and represent vectors graphically. <br> • Write vectors as linear combinations of unit vectors. <br> • Find the direction angles of vectors. <br> • Use vectors to model and solve real life problems. <br> • Find the dot product of two vectors and use the properties of the dot product. <br> • Find the angle between two vectors and determine whether two vectors are orthogonal. <br> • Write vectors as the sums of two vector components. <br> • Use the vectors to find the work done by a force. |

# PART II:  INSTRUCTIONAL STRATEGIES AND RESOURCES
## DESCRIBE THE LEARNING TARGETS.

**After each target, identify the New Jersey Student Learning Standards that are applicable.**

| Learning Target | NJSLS |
|---|---|
| 1. Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side | 1. NJSLS-G-SRT.D.9 |
| 2.  Prove the Laws of Sines and Cosines and use them to solve problems. | 2. NJSLS-G-SRT.D.10 |
| 3. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces | 3.  NJSLS-G-SRT.D.11 |
| 4. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\mathbf{v}$, $\|v\|$, $\|\mathbf{v}\|$, $v$)... | 4. NJSLS-N-VM.A.1 |
| 5 Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. | 5. NJSLS-N-VM.A.2 |
| 6. Add and subtract vectors. | 6. NJSLS-N-VM.B.4 |
| 7. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. | 7. NJSLS-N-VM.B.4a |
| 8. Compute the magnitude of a scalar multiple $c\mathbf{v}$ using $\|c\mathbf{v}\| = \|c\|\mathbf{v}$. Compute the direction of $c\mathbf{v}$ knowing that when $\|c\|\mathbf{v} \neq 0$, the direction of $c\mathbf{v}$ is either along $\mathbf{v}$ (for $c > 0$) or against $\mathbf{v}$ (for $c < 0$). | 8. NJSLS-N-VM.B.5b |

## Inter-Disciplinary Connections:

**Mathematical Modeling:**

- **Students can show how the Law of Sines can be used to help determine the distance from a boat to the shoreline, as shown in Ex. 48 pp. 411.**
- **Students can show how the Law of Cosines can be used to determine the lengths of the guy wires that anchor a tower, as shown in Ex. 53 pp. 418.**
- **Students can show how vectors can be used to determine the tension in the cables of two cranes lifting an object, as shown in Ex. 99 pp. 431.**
- **Students can show how dot product can be used to find the force necessary to keep a truck from**

**rolling down a hill, as shown in Ex. 73 pp. 441.**

**Students will engage with the following text:**

**Precalculus With Limits A Graphing Approach**- 7e   Ron Larson
Resources:  Course mate; A variety of technology tools, other texts as per teacher discretion.

**Students will write:**

Students will write notes and copy class examples to better comprehend the skills being taught. Students will write solutions to open-ended math problems and word problems dealing with real-world applications. Students will graph interpretations of functions.

## PART III:  TRANSFER OF KNOWLEDGE AND SKILLS
### DESCRIBE THE LEARNING EXPERIENCE.
### <u>How</u> will students uncover content and build skills.

**Section 6.1**

| | Regular | Honors |
|---|---|---|
| **Standards for Mathematical Practice** | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. |
| **Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)** | Day 1:  pp. 410-412<br>Ex. 7-19 odd, 27-51 odd, 54, 56-59 | Day 1: pp. 410-412<br>Ex. 12, 18-42 even, 44-50, 55-62 |

**Section 6.2**

| | Regular | Honors |
|---|---|---|
| **Standards for Mathematical Practice** | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. |
| **Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)** | Day 1:  pp. 417-419<br>Ex. 1-6, 7-15 odd, 25-30, 31-41 odd, 47-50, 53, 55, 59, 60, 64, 67-70 | Day 1: pp. 417-419<br>Ex. 11-18, 25-30, 32-48 even, 50-58, 61, 64, 66-70 |

## Section 6.3

| | Regular | Honors |
|---|---|---|
| **Standards for Mathematical Practice** | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. |
| **Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)** | Day 1 pp. 429-430<br>Ex. 1-12, 13-23 odd, 25-34, 37, 39, 43-46, 47-59 odd, 67-71 odd<br>Day 2:  pp 430-433<br>Ex. 75-91 odd, 95-98, 103, 107-119, 124, 127-133 odd | Day 1: pp 429-430<br>Ex. 16-42 even, 43-46, 54-72 even<br>Day 2:  pp 430-433<br>Ex. 82-90 even, 91-96, 98, 101, 103, 104, 106, 111-126 |

## Section 6.4

| | Regular | Honors |
|---|---|---|
| **Standards for Mathematical Practice** | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. | MP 1- Make sense of problems and persevere in solving them<br>MP 2- Reason abstractly and quantitatively<br>MP 3- Construct viable arguments and critique<br>MP 4- Model with mathematics<br>MP 5- Use appropriate tools strategically<br>MP 6- Attend to precision<br>MP 7- Look for and make use of structure<br>MP 8- Look for and express regularity in repeated reasoning. |
| **Practice and Apply Assigning Homework (Tasks are assigned as per the discretion of the teacher.)** | Day 1:  pp 440-441<br>Ex. 1-10, 11-53 odd, 57, 59<br>Day 2:  pp 441-442<br>Ex. 61-65, 67, 69, 70, 71-77 odd, 79-85, 91-99 odd | Day 1: pp. 440-441<br>Ex. 1-6, 8-60 even<br>Day 2:  pp 441-442<br>Ex. 61-65, 69-78, 84-88, 92-100 even |

# PART IV:  EVIDENCE OF LEARNING

**IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.**

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering
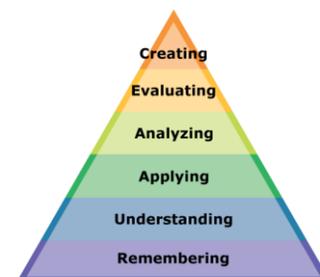
## Formative Assessments:

The effectiveness of the instructional program will be based on numerous activities and strategies including the following: teacher observations, students collaborating with peers, questioning strategies, student record-keeping, quizzes, exit/admit assignments, peer/self- assessments, learning/response logs, discussion and practice presentations

### Accommodations/Modifications:

As per student IEP or 504 Plan

## Summative Assessments:

The following assessments will be used to evaluate student learning, skill acquisition and academic achievement of the Standards of Mathematical Practice and the New Jersey Learning Standards for Mathematics listed under each chapter in the PreCalculus curriculum/syllabus at the conclusion of an instructional time period.

- **Diagnostic Pre-Test**
- **Chapter Tests**
- **Periodic Benchmark Tests**
- **End of Course Assessment**
- **Standardized Tests**

### Accommodations/Modifications:

As per student IEP or 504 Plan

## Performance Assessments:

The following assessments requires students to utilize various strands of mathematics.

- **Projects**
- **Performance Tasks**
- **Homework**
- **Classwork**

### Accommodations/Modifications:

As per student IEP or 504 Plan