Curriculum Sample Template

Grade Level	High School	**Content Area**	Math
Course Title (grades 9-12 Only)	Algebra II		
Length of Unit	5 Days	**Time of Year**	3rd quarter
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form a + b*i* with *a* and *b* real (N-CN.1). Students can use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers (N-CN.2). Students work through standards of mathematical practice in every mathematics lesson throughout the year.		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	The following methods of instruction are aligned to the program of instruction: *RTI*: Notes in CLOZE form are provided for Tier 2 and Tier 3 students as needed. Teacher will organize small group guided instruction for students as needed. Teacher will re-teach objectives focusing on multiple learning styles (verbal, visual, kinesthetic, etc.) as needed. *What Works Strategies*: Objectives are clearly communicated to students at the beginning of every lesson. Cooperative learning is used regularly in lessons emphasizing the thought process used as problems are solved (think-alouds). Homework is assigned for independent practice. Students will regularly receive criterion-referenced, timely and specific feedback on their performance. *SIOP*: Students regularly work with partners and small groups. Scaffolding involves significant teacher modeling and guided practice. Students will verbalize their thought processes as related to the problems they have solved (think-alouds). Notes in CLOZE form are provided for students as needed. When appropriate, mathematics vocabulary will be broken down and analyzed to help with comprehension of unfamiliar terms (e.g.: imaginary, complex, etc.). *Culturally Relevant Pedagogy*: Students will solve real-world problems that include topics relevant to them and their community.		
Standard Number and Description *List the Number* and full description for the required Standard.*	N-CN.3 - Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.		
Summative Assessment	The summative assessment for this objective is in the form of a quiz. Students will find conjugates of given complex numbers. Students will multiply given complex numbers with their respective conjugates. Students will calculate the moduli for a given complex number. Students will simplify a complex quotient into the form a + b*i*.		

Scoring Scale and Mastery Level	The summative assessment will be scored using an answer key. Each of the six questions is assigned a point value for a total of 20 points. Mastery is demonstrated with a score of 80% or above. A score of 20 = 100%, a score of 19 = 95%, a score of 18 = 90%, a score of 17 = 85%, a score of 16 = 80%, a score of 15 = 75%, etc.
Materials/Resources Needed	Textbook (*Prentice Hall, Algebra 2), notes in CLOZE form, homework starters for Tier 3 students. **Note: 2013-2014 Pearson textbooks, as mentioned in A.3 Program of Instruction, were not available at time of planning and publication, so earlier editions of Pearson/Prentice Hall textbooks were used.*

	Instruction	Student Activities
1	Objective: Students understand complex numbers come in conjugate pairs and students apply this knowledge in order to identify the conjugate of a given complex number. (written on board) 1) Teacher reads objective aloud to students. 2) Teacher defines the conjugate of a complex number a + b*i* as the complex number a - b*i*. Teacher will model examples on how to find the conjugate of a complex number. Teacher models correct use of vocabulary and verbalizes the thought process used to calculate solutions (think alouds). 3) Teacher provides students with problems in which they are to find the conjugate of a complex number. 4) Teacher introduces and models that along with irrational roots of polynomials coming in conjugate pairs, imaginary roots of polynomials also come in conjugate pairs. Teacher models correct use of vocabulary and verbalizes the thought process used to calculate solutions (think alouds). 5) Teacher provides examples for students to solve with partners. Teacher actively roams around the classroom monitoring discussions and making notes of observations to be shared with the class.	1) Students follow along with the teacher and the write objective(s) into their notes. (A set of notes in CLOZE form will be provided to students who have been identified as needing them, Tier 3 and some Tier 2.) 2) Students write down definition and examples in their notes and ask clarifying questions as needed. 3) Working in pairs, students find the conjugates of given complex numbers. 4) Students write definition and examples in their notes and ask clarifying questions as needed. 5) Students discuss and solve given problems with their partners. 6) Pairs of student volunteers present their solutions to the class, focusing on correct use of vocabulary and verbalizing their thought processes (think alouds). 7) Students complete homework problems independently. (For Tier 3 students, the first three problems are in hand-out form with the first problem completed and the next two problems partially completed)

	6) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 7) Teacher assigns homework: Students are given complex numbers and asked to identify the complex conjugates. (Additional problems will be made available for enrichment when appropriate for individual students.)	
2	Objective: Students calculate the product of a complex number and it's conjugate. 1) Teacher instructs students to check their homework with their table groups (4 students). Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class. 2) Teacher facilitates whole-class discussion about individual homework problems, if necessary, asking for volunteers to share their solutions/thought processes with the class. Teacher shares observations when appropriate. 3) Teacher reads objective aloud to students. 4) Teacher models examples on how to find the product of a complex number and it's conjugate. Teacher models correct use of vocabulary and verbalizes the thought process used to calculate solutions (think alouds). 5) Teacher provides students with problems in which they are to calculate the product of a given complex number and its conjugate. Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class. 6) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 7) Teacher assigns homework: Students are provided problems in which to calculate the product of a given complex number and its conjugate. (Additional problems are available for enrichment, when appropriate, for individual students.)	1) Students cooperatively share their answers. They discuss any solutions that they did not agree on and attempt to come to a group consensus on the solutions to these problems. If there is a solution they do not agree on, they will note that problem to share with the whole class to see if someone else in the room can explain/model the solution. 2) Selected students share their solutions/thought processes if needed. Students are the teachers at this point. 3) Students follow along with teacher and write objective into their notes. (A set of notes in CLOZE form are provided to students identified as needing them, Tier 3 and some Tier 2.) 4) Students write examples in their notes and ask clarifying questions as needed. 5) Students discuss and solve given problems with their partners. 6) Pairs of student volunteers present their solutions to the class, focusing on correct use of vocabulary and verbalizing their thought processes (think alouds). 7) Students complete homework problems independently. (For Tier 3 students, the first three problems will be in hand-out form with the first problem completed and the next two problems partially completed.)

3	Objective: Students calculate the moduli of a complex number. (written on board) 1) Teacher instructs students to check their homework with their table groups (4 students). Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class. 2) Teacher facilitates whole-class discussion about individual homework problems, if necessary, asking for volunteers to share their solutions/thought processes with the class. Teacher shares observations when appropriate. 3) Teacher reads objective aloud to students. 4) Teacher defines moduli and models examples on how to use the Pythagorean Theorem to find the moduli of a complex number. Teacher models correct use of vocabulary and verbalizes the thought process used to calculate solutions (think alouds). 5) Teacher provides students with problems in which they are to use the Pythagorean Theorem to find the moduli of a given complex number. Teacher actively roams around the classroom monitoring the discussions and making notes of any observations to be shared with the class. 6) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 7) Since the distance any complex number is from the point $0 + 0i$ in the complex number plane is equal to the square root of the product of the complex number with its conjugate, the teacher models how to use this fact as an alternative method to finding a complex number's moduli. Teacher uses examples from 4) and 5) above to model this alternative method. 8) Teacher provides students with problems in which to practice use of this alternative method to find the moduli of a given complex number. Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class.	1) Students cooperatively share their answers. They discuss any solutions that they did not agree on and attempt to come to a group consensus on the solutions to these problems. If there is a solution they do not agree on, they will note that problem to share with the whole class to see if someone else in the room can explain/model the solution. 2) Selected students share their solutions/thought processes if needed. Students are the teachers at this point. 3) Students follow along with teacher and write objective into their notes. (A set of notes in CLOZE form are provided to students identified as needing them, Tier 3 and some Tier 2.) 4) Students write down definition and examples in their notes and ask clarifying questions as needed. 5) Students discuss and solve given problems with their partners. 6) Pairs of student volunteers present their solutions to the class, focusing on correct use of vocabulary and verbalizing their thought processes (think alouds). 7) Students write examples in their notes and ask clarifying questions when needed. 8) Students discuss and solve given problems with their partners. 9) Pairs of student volunteers present their solutions to the class, focusing on correct use of vocabulary and verbalizing their thought processes. 10) Students complete homework problems independently. (For Tier 3 students, the first three problems will be in hand-out form with the first problem completed and the next two problems partially completed.)

	9) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 10) Teacher assigns homework: Students are provided problems in which to calculate the product of a given complex number and its conjugate. (Additional problems are made available for enrichment when appropriate for individual students.)	
4	Objective: Students will simplify a complex quotient into the form a + b*i*. (written on board) 1) Teacher instructs students to check their homework with their table groups (4 students). Teacher actively roams around the classroom monitoring discussions and making notes of any observations to be shared with the class. 2) Teacher facilitates whole-class discussion about individual homework problems, if necessary, asking for volunteers to share their solutions/thought processes with the class. Teacher shares observations when appropriate. 3) Teacher reads objective aloud to students. 4) Teacher models how to simplify the complex quotient into the form a + b*i*. Teacher models correct use of vocabulary and verbalizes the thought process used to calculate solutions (think alouds). 5) Teacher provides students with problems in which they are to simplify the complex quotient into the form a + b*i*. Teacher actively roams around the classroom monitoring discussions, making notes of observations to be shared with the class. 6) Teacher facilitates classroom discussion on given examples and shares observations when appropriate. 7) Teacher assigns homework: Students are provided problems where they are asked to simplify the complex quotient into the form a + b*i*. (Additional problems are made available for enrichment when appropriate for individual students.)	1) Students cooperatively share their answers. They discuss any solutions that they did not agree on and attempt to come to a group consensus on the solutions to these problems. If there is a solution they do not agree on, they will note that problem to share with the whole class to see if someone else in the room can explain/model the solution. 2) Selected students share their solutions/thought processes if needed. Students are the teachers at this point. 3) Students follow along with teacher and write objective into their notes. (A set of notes in CLOZE form are provided to students identified as needing them, Tier 3 and some Tier 2.) 4) Students write examples in their notes and ask clarifying questions as needed. 5) Students discuss and solve given problems with their partners. 6) Pairs of student volunteers present their solutions to the class, using correct vocabulary and verbalizing their thought process. (think alouds). 7) Students complete homework problems independently. (For Tier 3 students, the first three problems will be in hand-out form with the first problem completed and the next two problems partially completed.)

5	Objective: Students find the conjugate of a complex number and use conjugates to find moduli and quotients of complex numbers. (written on board) 1) Teacher instructs students to check their homework with their table groups (4 students). Teacher actively roams around the classroom monitoring discussions and making notes of observations to be shared with the class. 2) Teacher facilitates whole-class discussion about individual homework problems, if necessary, asking for volunteers to share their solutions/thought processes with the class. Teacher shares observations when appropriate. 3)Teacher gives summative assessment.	1) Students cooperatively share their answers. They discuss any solutions that they did not agree on and attempt to come to a group consensus on the solutions to these problems. If there is a solution they do not agree on, they will note that problem to share with the whole class to see if someone else in the room can explain/model the solution. 2) Selected students share their solutions/thought processes if needed. Students are the teachers at this point. 3) Students complete summative assessment.

Paste Summative Assessment Here:

Quiz: Complex Numbers.

Find the conjugate of the following complex numbers.

1. $-\sqrt{3}+\sqrt{3}\cdot i$

2. $\sqrt{2}-\sqrt{5}\cdot i$

Multiply the complex number with its conjugate.

3. $1+i$

4. $-\sqrt{2}+\sqrt{5}\cdot i$

5. Find the moduli for the complex number $\frac{1}{2}+\frac{\sqrt{5}}{2}\cdot i$

6. Simplify the complex quotient into the form a+b*i*: $\frac{3-2i}{2+3i}$

Paste AnswerScoring Rubric Here:

Quiz: Complex Numbers – ANSWER KEY

Mastery is 80% or above.

Quiz is worth 20 points. Numbers 1 - 2 are two points each. Numbers 3 – 6 are four points each.

1. $-\sqrt{3}-\sqrt{3}\cdot i$

2. $\sqrt{2}-\sqrt{5}\cdot i$

3. 2

4. 7

5. $\sqrt{\frac{3}{2}}$

6. $-i$