Perform arithmetic operations with complex numbers (Standards N.CN.1–2).	
Standard N.CN.1: Know there is a complex number i such that i^2 = -1, and every complex number has the form $a + bi$ with a and b real.	
Concepts and Skills to Master	
• Understand that the set of complex numbers includes the set of all real numbers and the set of imaginary numbers. • Define i in terms of solutions to x^2 = -1. • Express numbers in the form $a + bi$. • Describe a context from which complex numbers can arise – specifically, the solution of quadratic equations of the form x^2 = a. where a is a negative real number.	
Related Standards: Current Course	Related Standards: Future Courses
II.N.CN.2, II.N.CN.7, II.N.CN.8, II.N.CN.9, II.A.REI.4	III.N.CN.8, III.N.CN.9, III.A.APR.3, P.N.CN.3, P.N.CN.4, P.N.CN.5, P.N.CN.6, P.N.CN.10

Support for Teachers

Critical Background Knowledge
• Understand rational numbers (6.NS.6, 7.NS.1, 7.NS.2) and irrational numbers (8.NS.1) as part of the real number system. • Use square root to represent solutions to equations (8.EE.2)
Academic Vocabulary
real numbers, complex numbers, imaginary numbers, i, $a + bi$
Resources:
Curriculum Resources: https://www.uen.org/core/core.do?courseNum=5620#71469

Perform arithmetic operations with complex numbers (Standards N.CN.1–2).
Standard N.CN.2: Use the relation i^2 = -1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. Limit to multiplications that involve i^2 as the highest power of i.
Concepts and Skills to Master
• Use properties of operations (commutative, associative, and distributive) to add, subtract, and multiply complex numbers.

Related Standards: Current Course	Related Standards: Future Courses
II.N.RN.2, II.N.CN.1, II.N.CN.7, II.N.CN.8, II.A.SSE.2, II.A.SSE.3, II.A.APR.1	III.N.CN.8, III.A.SSE.2, P.N.CN.3, P.N.CN.5, P.N.CN.6, P.N.CN.10

Support for Teachers

Critical Background Knowledge
• Apply the properties of operations, including integer exponents (8.EE.1), to generate (6.EE.3) and identify equivalent expressions (6.EE.4, 7.EE.2) • Add, subtract, multiply and divide rational numbers (7.NS.1, 7.NS.2)
Academic Vocabulary
complex numbers, i
Resources:
Curriculum Resources: https://www.uen.org/core/core.do?courseNum=5620#71470

Use complex numbers in polynomial identities and equations (Standards N.CN.7–9)	
Standard II.N.CN.7: Solve quadratic equations with real coefficients that have complex solutions.	
Concepts and Skills to Master	
• Solve quadratic equations that have complex solutions and understand the nature of the roots.	
Related Standards: Current Course	Related Standards: Future Courses
II.N.CN.1, II.N.CN.2, II.N.CN.8, II.N.CN.9, II.A.SSE.2, II.A.SSE.3, II.A.CED.1, II.A.REI.4, II.F.IF.8, II.F.IF.9	III.N.CN.8, III.N.CN.9, III.A.APR.2, III.A.APR.3, III.A.APR.6, III.A.CED.1, III.A.SSE.2, III.F.IF.8, III.F.IF.9, P.N.CN.3

Support for Teachers

Critical Background Knowledge (Access Background Knowledge)
•   Use square root and cube root symbols to represent solutions to equations (8.EE.2)
•   Solve simple exponential equations (I.A.REI.3c)
Academic Vocabulary
complex number, imaginary number, conjugate, (similarities and differences between): roots, solutions, zeros
Resources
Curriculum Resources: https://www.uen.org/core/core.do?courseNum=5620#71512

Use complex numbers in polynomial identities and equations (Standards N.CN.7–9)	
Standard N.CN.8: Extend polynomial identities to the complex numbers. Limit to quadratics with real coefficients. *For example, rewrite* x^2 *+ 4 as (x + 2i)(x − 2i).*	
Concepts and Skills to Master	
- Express a quadratic as a product of two complex factors. - Use algebraic reasoning to simplify and extend polynomial identities to complex numbers.	
Related Standards: Current Course	Related Standards: Future Courses
II.N.RN.2, II.N.CN.1, II.N.CN.2, II.N.CN.7, II.N.CN.9, II.A.SSE.2, II.A.SSE.3, II.A.REI.4, II.F.IF.8, II.F.IF.9	III.N.CN.9, III.A.APR.2, III.A.APR.3, III.A.APR.4, III.A.APR.6, III.A.SSE.2, III.F.IF.8, III.F.IF.9, P.N.CN.3

Support for Teachers

Critical Background Knowledge
Apply the properties of operations to generate equivalent expressions (6.EE.3, 6.EE.4, 7.EE.2, 8.EE.1)
Academic Vocabulary
Polynomial identity, conjugates, complex numbers, *i*
Resources:
Curriculum Resources: https://www.uen.org/core/core.do?courseNum=5620#71513

Use complex numbers in polynomial identities and equations (Standards N.CN.7–9)
Standard N.CN.9: Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Concepts and Skills to Master
• Know that the Fundamental Theorem of Algebra guarantees that polynomial functions will have solutions in the complex number system.   • Show that quadratic functions have two solutions in the complex number system.

Related Standards: Current Course	Related Standards: Future Courses
II.N.CN.1, II.N.CN.2, II.N.CN.7, II.N.CN.8, II.A.APR.1, II.A.SSE.2, II.A.SSE.3, II.A.CED.1, II.A.REI.4, II.F.IF.8, II.F.IF.9	III.N.CN.8, III.N.CN.9, III.A.APR.1, III.A.APR.2, III.A.APR.3, III.A.APR.6, III.A.CED.1, III.A.SSE.2, III.F.IF.8, III.F.IF.9, P.N.CN.3

Support for Teachers

Critical Background Knowledge
• Use square root and cube root symbols to represent solutions to equations (8.EE.2)   • Solve linear equations (I.A.REI.3) and simple exponential equations (I.A.REI.3c)
Academic Vocabulary
Fundamental Theorem of Algebra, complex number, roots, real number system, multiplicity
Resources:
Curriculum Resources: https://www.uen.org/core/core.do?courseNum=5620#71514