Create equations that describe numbers or relationships, using all available types of functions to create such equations (Standards A.CED.1-4).

**Standard III.A.CED.1:** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

### Concepts and Skills to Master
- Create equations and inequalities in one variable and use them to solve problems of all available types of functions.
- Understand the meaning of solutions, including extraneous, in reference to context.
- Show solutions to inequalities using set notation, interval notation, and inequalities.

### Related Standards: Current Course
- III.A.CED.1, III.A.REI.2, III.A.APR.2, III.A.APR.3

### Related Standards: Future Courses
- P.N.VM.3

### Support for Teachers

#### Critical Background Knowledge
- Create equations and inequalities in one variable and use them to solve problems (I.A.CED.1, II.A.CED.1, I.A.REI.3, II.A.REI.4)
- Create and solve equations (6.EE.7, 7.EE.4a, 8.EE.7) and inequalities (6.EE.8, 7.EE.4b, and 8.EE.7)
- Solve exponential equations that can be solved using laws of exponents (I.A.CED.1 and I.A.REI.3)
- Write recursive and explicit equations (I.F.BF.1a, I.F.BF.2)

#### Academic Vocabulary
- extraneous solutions

#### Resources
- **Curriculum Resources:** http://www.uen.org/core/core.do?courseNum=5630#71620
Create equations that describe numbers or relationships, using all available types of functions to create such equations (Standards A.CED.1-4).

**Standard III.A.CED.2:** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

### Concepts and Skills to Master
- Create and graph an equation to represent relationships between two quantities (include linear, exponential, quadratic, simple rational, square root, cube root, polynomial, trigonometric and logarithmic relationships).
- Create and graph absolute value functions using various function types (i.e., polynomial, logarithmic, trigonometric, etc) and write them as both piecewise defined functions and absolute value functions.
- Create equations from various models.
- Graph equations on coordinate axes with appropriate labels and scales.

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<thead>
<tr>
<th>Related Standards: Current Course</th>
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<tr>
<td>III.A.CED.1, III.A.SSE.1, III.A.SSE.2, III.A.SSE.4, III.F.IF.4, III.F.IF.5, III.F.IF.7, III.F.BF.1, III.F.BF.3, III.F.LE.3</td>
<td>P.A.REI.8, P.A.REI.9</td>
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</table>

### Support for Teachers

#### Critical Background Knowledge
- Create and graph equations representing linear, exponential, and quadratic relationships between two quantities (I.A.CED.2, II.A.CED.2).
- All things linear, exponential and quadratic (Secondary Mathematics I and Secondary Mathematics II).
- Choose appropriate scales and label a graph (I.N.Q.1 and I.N.Q.2).

#### Academic Vocabulary
- asymptote, independent and dependent variables, extraneous solution, rational, square root, cube root, polynomial, logarithmic

#### Resources
- [Curriculum Resources](http://www.uen.org/core/core.do?courseNum=5630#71620)
Create equations that describe numbers or relationships, using all available types of functions to create such equations (Standards A.CED.1-4).

**Standard III.A.CED.3:** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, maximizing the volume of a box for a given surface area while drawing attention to the practical domain.*

**Concepts and Skills to Master**

- Write and graph equations and inequalities representing constraints in contextual situations. Pay attention to constraints via the domain, range, asymptotes, and points of discontinuity.
- Determine whether a point is a solution to an equation or inequality.
- Interpret the meaning and viability of a solution based on the constraints created by the context.

**Related Standards: Current Course**

III.A.CED.1, III.A.CED.2, III.A.CED.4, III.A.REI.2, III.A.REI.11, III.F.IF.4, III.F.IF.5, III.F.IF.7

**Related Standards: Future Courses**

P.N.VM.13

**Support for Teachers**

**Critical Background Knowledge**

- Represent constraints and interpret solutions as viable or non-viable in a modeling context (I.A.CED.3)
- Graph the solutions to a linear inequality in two variables (I.A.REI.12)
- Solve systems of equations graphically (8.EE.8) and using various representations (I.A.REI.6 and II.A.REI.7)
- Identify key features of functions (I.F.IF.4 and II.F.IF.4) and relate the domain of a function to the relationship it describes (I.F.IF.5)

**Academic Vocabulary**

- constraint, viable, non-viable, asymptotes, points of discontinuity, solution set

**Resources**

*Curriculum Resources:* http://www.uen.org/core/core.do?courseNum=5630#71620
Create equations that describe numbers or relationships, using all available types of functions to create such equations (Standards A.CED.1-4).

**Standard III.A.CED.4:** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange the compound interest formula to solve for $t$: $A = P(1+r/n)^{nt}$

**Concepts and Skills to Master**
- Extend the concepts used in solving numerical equations to rearranging formulas for a particular variable, including rational, square root, cube root, polynomial, exponential, and logarithmic formulas

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<td>P.F.BF.4</td>
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</tbody>
</table>

**Support for Teachers**

**Critical Background Knowledge**
- Solving linear and quadratic formulas for a quantity of interest (I.A.CED.4, II.A.CED.4)

**Academic Vocabulary**
- quantity of interest, variable, literal equations, formula, rational, square root, cube root, polynomial, logarithmic

**Resources**
- Curriculum Resources: [http://www.uen.org/core/core.do?courseNum=5630#71620](http://www.uen.org/core/core.do?courseNum=5630#71620)