CUNY Elementary Algebra Proficiency Standards Details
As amended 3/30/2012

The letters and numbers in parentheses correspond to statements from the NYC Department of Education’s Integrated Algebra details by Strand. An asterisk (*) indicates the statement was modified to reflect a significant difference.

Pre-Algebra Prerequisites. These are assumed foundations.

a) Perform the four basic binary operations with rational numbers represented as fractions or decimals including signed numbers.
b) Understand and determine the order relations $<$, $>$, $=$ of real numbers.
c) Properly apply the order of operations (only whole number exponents).
d) Understand how to compute the absolute value of real numbers.
e) Find the areas and/or perimeters of polygons (triangles, rectangles, squares, trapezoids) and circles.

TOPICS/LEARNING OBJECTIVES THAT WILL BE TESTED ON THE UNIFORM FINAL EXAM
These topics are not sequentially ordered according to dependencies or suggested sequencing.

1) Operations
a) Radicals. Includes only square roots of nonnegative numbers.
i. Simplify radical terms (no variable in the radicand). (AN2)
ii. Perform addition, subtraction, multiplication and division using like and unlike radical terms and express the result in simplest form. (AN3*)
   1. Multiplication should involve at most one factor of the form $a + b\sqrt{d}$ with $a \neq 0$.
   2. All divisors and denominators should be of the form $a + b\sqrt{d}$ with $a = 0$.
b) Scientific Notation
i. Convert between standard decimal and scientific notation.
ii. Understand and use scientific notation to compute products and quotients of numbers. (AN4)
c) Exponents. Multiply and divide monomial expressions with a common base using the properties of exponents. All exponents are integral. (AA12)

2) Variables and Expressions
a) Translate a quantitative verbal phrase into an algebraic expression. (AA1)
b) Add and subtract monomials and polynomials. (AA13*)
c) Multiplication of a monomial and binomial by any degree polynomial. (AA13*)
d) Divide a polynomial by a monomial, where the quotient has no remainder. (AA14*)
e) Factoring
i. Identify and factor the greatest common factor from an algebraic expression.
ii. Identify and factor the difference of two perfect squares. (AA19)
iii. Factor all trinomials of a single variable, including a leading coefficient other than 1.

iv. Factor algebraic expressions by grouping with up to 4 terms, possibly with multiple variables.

v. Factor algebraic expressions completely where the factorization requires more than one step (e.g. first remove the GCF and then factor the remaining factor). (AA20*)

3) Equations and Inequalities
   a. Translate verbal sentences into mathematical equations. (AA4)
   b. Solve all types of linear equations in one variable. (AA22)
   c. Systems of Linear Equations (2x2) †
      i. Solve systems of two linear equations in two variables algebraically. (AA10)
      ii. Graph and solve systems of linear equations with rational coefficients in two variables. (AG7*)
      † Note: On a multiple choice exam it is impossible to impose a solution method on students. As a result, we will combine these two objectives into a single test item and assume students may use either method when answering the question.
   d. Solve literal equations for a given variable. (AA23) (Area and perimeter formulas should be included as one source of examples.)
   e. Quadratic Equations:
      i. Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients. (AA27*)
      ii. Solve quadratic equations with no linear term.
      iii. Determine the measure of a third side of a right triangle using the Pythagorean Theorem, given the lengths of any two sides. (AA45)
   f. Linear inequalities in a single variable
      i. Solve linear inequalities in one variable. (AA24)
      ii. Represent solutions to linear inequalities as a single inequality.
      iii. Represent the solution to a linear inequality in one variable on a number line.

4) Functions and functional notation. This is an introduction to basic notational representation and should not include any explicit discussion of functions vs. relations, domain, range and vertical line test, etc.
   a. Use function notation to compute a single output for simple linear and quadratic relationships.
5) Coordinate Geometry
   a. Slope and equations of a line
      i. Determine the slope of a line, given the coordinates of two points on the line. (AA33)
      ii. Write the equation of a line, given its slope and the coordinates of a point on the line. (AA34)
      iii. Write the equation of a line, given the coordinates of two points on the line. (AA35)
      iv. Write the equation of a line parallel to the x- or y-axis. (AA36)
      v. Determine the slope and y-intercept of a line, given its equation in any form. (AA37*)
      vi. Write and transform equations of lines in the following forms
           1. Point-Slope form
           2. Slope Intercept form
           3. \(Ax + By = C\) form
   b. Draw and recognize graphs of lines.

6) Proportions and percent
   a. Solve simple verbal problem with two quantities that are proportional.
   b. Solve simple verbal problem involving a single percent and/or a single percent increase/decrease.