Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	
Content Domain: **Expressions and Equations**	
Target D [m]: Analyze and solve linear equations and pairs of simultaneous linear equations. (DOK Levels 1, 2) Tasks for this target will ask students to solve linear equations in one variable and recognize when one, infinite, or no solutions exist. Some problems will require students to apply the distributive property and collect like terms. Tasks for this target will also ask students to solve systems of two linear equations in two variables algebraically and estimate solutions graphically. Some problems will ask students to recognize simple cases of two equations that represent the same line or that have no solution. This target may be combined with 8.F Target F to create problems where students determine a point of intersection given an initial value and rate of change, including cases where no solution exists. Real-world and mathematical problems that lead to two linear equations in two variables will be assessed in connection with targets from Claims 2 and 4.	
Standards: 8.EE.C, 8.EE.C.7, 8.EE.C.8	**8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.** **8.EE.C.7** Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **8.EE.C.8** Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line though the first pair of points intersects the line through and second pair.*
Related Below-Grade and Above-Grade Standards for Purposes of Planning for Vertical Scaling:	**Related Grade 7 Standards** **7.EE.A Use properties of operations to generate equivalent expressions.** **7.EE.A.1** Apply properties of operations as strategies to add,

7.EE.A, 7.EE.A.1, 7.EE.B, 7.EE.B.3, 7.EE.B.4 A-CED.A, A–CED.A.1, A–CED.A.2, A–CED.A.3, A–CED.A.4	subtract, factor, and expand linear expressions with rational coefficients. **7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.** **7.EE.B.3** Solve multi–step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* **7.EE.B.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.* **Related High School Standards** **A-CED.A Create equations that describe numbers or relationships.** **A–CED.A.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.* **A–CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **A–CED.A.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* **A–CED.A.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For*

	example, rearrange Ohm's law V = IR to highlight resistance, R.
DOK Levels:	1, 2
Achievement Level Descriptors:	
RANGE Achievement Level Descriptor (Range ALD) Target D: Analyze and solve linear equations and pairs of simultaneous linear equations.	**Level 1** Students should be able to solve linear equations in one variable with integer coefficients.
	Level 2 Students should be able to analyze and solve systems of linear equations graphically by understanding that the solution of a system of linear equations in two variables corresponds to the point of intersection on a plane. They should be able to solve and produce examples of linear equations in one variable with rational coefficients with one solution, infinitely many solutions, or no solution.
	Level 3 Students should be able to classify systems of linear equations as having graphs that are intersecting, collinear, or parallel; solve linear systems algebraically and estimate solutions using a variety of approaches; and show that a linear equation in one variable has one solution, no solution, or infinitely many solutions by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). They should be able to solve and produce examples of linear equations in one variable, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
	Level 4 Students should be able to analyze and solve problems leading to two linear equations in two variables in multiple representations.
Evidence Required:	1. The student identifies and writes examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. 2. The student solves linear equations in one variable with rational coefficients, including equations with solutions that require expanding expressions using the distributive property and collecting like terms. 3. The student estimates solutions by graphing systems of two linear equations in two variables. 4. The student recognizes when a system of two linear equations in two variables has one solution, no solution, or infinitely many solutions. 5. The student solves a system of two linear equations in two variables algebraically, or solves real-world and mathematical problems leading to two linear equations in two variables.
Allowable Item Types:	Multiple Choice, single correct response; Multiple Choice, multiple correct response; Drag and Drop, Equation/Numeric, Graphing
Allowable Stimulus Materials:	Linear equations, solutions of linear equations, systems of linear equations (a single brace may be used to indicate a system), solutions of systems of linear equations, graphs of systems of linear equations, real-world scenarios that can be modeled by systems of linear equations, mathematical scenarios that can be

	modeled by systems of linear equations
Construct-Relevant Vocabulary:	Linear equation, y–intercept, slope, standard form, intersection, system, solution, coefficient, constant, ordered pair, x-coordinate, y–coordinate
Allowable Tools:	Calculator
Target–Specific Attributes	Equations must be linear with rational coefficients.
Non–Targeted Constructs:	
Accessibility Guidance:	Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items. Language Key Considerations: • Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context • Avoid sentences with multiple clauses • Use vocabulary that is at or below grade level • Avoid ambiguous or obscure words, idioms, jargon, unusual names and references Visual Elements/Design Key Considerations: • Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context • Use the simplest graphic possible with the greatest degree of contrast, and include clear, concise labels where necessary • Avoid crowding of details and graphics Items are selected for a student's test according to the blueprint, which selects items based on Claims and targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and target, even if some item formats are not fully accessible using current technology.[2]
Development Notes:	8.EE.C.8a will be assessed in connection with targets from Claims 2 and 3.

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

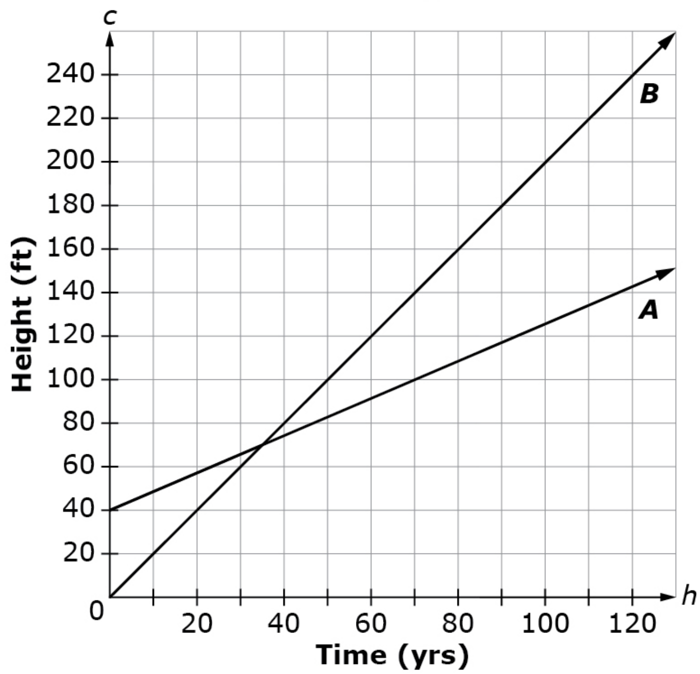
[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

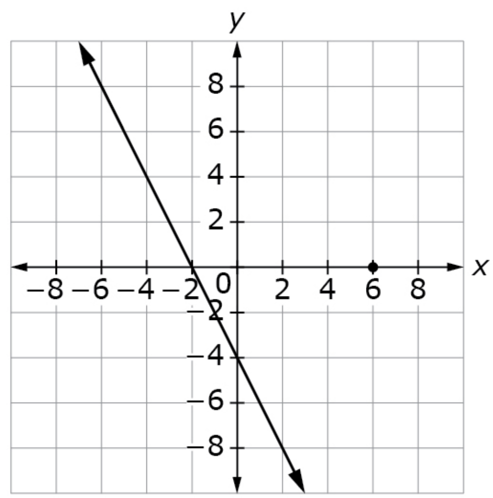
Task Model 1 **Response Type: Drag and Drop** **DOK Level 2** **8.EE.C.7a** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **Evidence Required:** 1. The student identifies and writes examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. **Tools:** Calculator **Accessibility Note:** Drag and Drop items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Prompt Features:** The student is prompted to create a linear equation in one variable that has exactly one solution, infinitely many solutions, or no solutions. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Equations have *px* or *q* + *x* or a constant one each side, where *p*, *q* and the constant are integers. • Equations have multiple terms with integer coefficients on each side, but no parentheses. • Equations have any linear expression with integer coefficients on each side. • Equations have multiple terms with rational coefficients on each side. It should be possible to answer the item correctly with integers for the missing terms. • Equations have any linear expression with rational coefficients on each side. It should be possible to answer the item correctly with integers for the missing terms. **TM1a** **Stimulus:** The student is presented with a linear equation in one variable with missing numbers. **Example Stem 1:** Drag a number into each box to create an equation that has exactly one real solution. $3(2x+5)-x=\square x+\square$ **Rubric:** (1 point) Correct answer is any number other than 5 for the coefficient *of x* and any number as the constant. **Example Stem 2:** Drag a number into each box to create an equation that has no real solution. $3(2x+5)-x=\square x+\square$ **Rubric:** (1 point) Correct answer is 5 for the coefficient of *x* and any number other than 15 for the constant. **Example Stem 3:** Drag a number into each box to create an equation that has an infinite number of solutions. $3(2x+5)-x=\square x+\square$ **Rubric:** (1 point) Correct answer has 5 for the coefficient of x and 15 for the constant. **Response Type:** Drag and Drop

Task Model 1 **Response Type: Multiple Choice, multiple correct response** **DOK Level 2** **8.EE.C.7a** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **Evidence Required:** 1. The student identifies and writes examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. **Tools:** Calculator	**Prompt Features:** The student is prompted to recognize linear equations in one variable that have exactly one solution, infinitely many solutions, or no solutions. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Equations have *px* or *q* + *x* or a constant one each side, where *p*, *q* and the constant are integers. • Equations have multiple terms with integer coefficients on each side, but no parentheses. • Equations have any linear expression with integer coefficients on each side. • Equations have multiple terms with rational coefficients on each side. • Equations have any linear expression with rational coefficients on each side. **TM1b** **Stimulus:** The student is presented with linear equations in one variable. **Example Stem:** Select **all** equations that have no solution. A. $6x - 2 - 3x = 3x - 2$ B. $6x - (3x + 8) = 16x$ C. $10 + 6x = 15 + 9x - 3x$ D. $11 + 3x - 7 = 6x + 5 - 3x$ **Answer Choices:** Each answer choice is a linear equation with one solution, infinitely many solutions, or no solutions. **Rubric:** (1 point) Student selects all the correct equations and no incorrect equations (e.g., C and D). **Response Type:** Multiple Choice, multiple correct response

Task Model 1 **Response Type: Multiple Choice, single select response** **DOK Level 2** **8.EE.C.7a** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **Evidence Required:** 1. The student identifies and writes examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. **Tools:** Calculator	**Prompt Features:** The student is prompted to analyze linear equations in one variable that result in exactly one solution, infinitely many solutions, or no solutions. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Equations have px or $q + x$ or a constant one each side, where p, q and the constant are integers. • Equations have multiple terms with integer coefficients on each side, but no parentheses. • Equations have any linear expression with integer coefficients on each side. • Equations have multiple terms with rational coefficients on each side. • Equations have any linear expression with rational coefficients on each side. **TM1c** **Stimulus:** The student is presented with linear equations in one variable. **Example Stem:** Kim is solving the following linear equation. $11 + 3x - 7 = 6x + 5 - 3x$ Her final two steps are: $4 + 3x = 3x + 5$ $4 = 5$ Select the statement that correctly interprets Kim's solution. A. The solution is $x = 0$. B. The solution is the ordered pair (4, 5). C. There is no solution since 4 = 5 is a false statement. D. There are infinitely many solutions because there is no x in the final equation. **Answer Choices:** Distractors are incorrect statements about the interpretation of the solution. If $x = 0$, students may incorrectly identify that as an equation that has no solution. **Rubric:** (1 point) Correct answer is the statement that describes the solution to the system of equations (e.g., C). **Response Type:** Multiple Choice, single correct response

Task Model 2 **Response Type: Equation/Numeric** **DOK Level 2** **8.EE.C.7b** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **Evidence Required:** 2. The student solves linear equations in one variable with rational coefficients, including equations with solutions that require expanding expressions using the distributive property and collecting like terms. **Tools:** Calculator	**Prompt Features:** The student is prompted to solve linear equations that require expanding expressions and collecting like terms if solved in the conventional way. **Stimulus Guidelines:** • Equation requires student to collect like terms or use the distributive property if solved in the conventional way. • Item difficulty can be adjusted via these example methods: o Equations have *px* or *q* + *x* or a constant one each side, where *p*, *q* and the constant are integers. o Equations have multiple terms with integer coefficients on each side, but no parentheses. o Equations have any linear expression with integer coefficients on each side. o Equations have multiple terms with rational coefficients on each side. o Equations have any linear expression with rational coefficients on each side. **TM2** **Stimulus:** The student is presented with a linear equation in one variable. **Example Stem:** Enter the value for x that makes the equation $-4(x + 13) + 3x = 80$ true. **Rubric:** (1 point) Correct answer is the value of x that solves the equation, expressed in any of its equivalent forms (e.g., –132). **Response Type:** Equation/Numeric

Task Model 3
 	
Response Type: Equation/Numeric
 	
DOK Level 1
 	
8.EE.C.8b
Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example,* $3x + 2y = 5$ *and* $3x + 2y = 6$ *have no solution because* $3x + 2y$ *cannot simultaneously be 5 and 6.*
 	
Evidence Required:
3. The student estimates solutions by graphing systems of two linear equations in two variables.
 	
Tools: Calculator
	Prompt Features: The student identifies solutions to a system of two linear equations in two variables by locating points of intersection of their graphs.
	
	Stimulus Guidelines:
	• Context should be familiar to 13–15 year olds.
	• Student interprets either the x value or the y value of the solution within the given context.
	• Item difficulty can be adjusted via these example methods:
	    o Point of intersection on graph is on intersecting grid lines.
	    o Point of intersection on graph is not intersecting grid lines.
	
	TM3a
	Stimulus: The student is presented with a graph of a system of two linear equations having one solution.
	
	Example Stem: The graph shown compares the height of Tree *A* and the height Tree *B* over time (in years).
	
	Tree Heights
	
	
	How many years after Tree *B* was planted did Tree *A* and Tree *B* have the same height?
	
	Rubric: (1 point) Student correctly gives the appropriate value from the coordinate point (e.g., 35 years).
	
	Response Type: Equation/Numeric

Task Model 3
 	
Response Type: Graphing
 	
DOK Level 2
 	
8.EE.C.8b
Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example,* $3x + 2y = 5$ *and* $3x + 2y = 6$ *have no solution because* $3x + 2y$ *cannot simultaneously be 5 and 6.*
 	
Evidence Required:
3. The student estimates solutions by graphing systems of two linear equations in two variables.
 	
Tools: Calculator
 	
Accessibility Note: Drag and Drop items are not currently able to be Brailled. Minimize the number of items developed to this TM.
	Prompt Features: The student is prompted to graph one of the equations in a system of two linear equations in two variables with one solution.
	
	Stimulus Guidelines:
	• The student uses the Add Arrow tool to draw the line on a coordinate grid with labeled x– and y–axes and a scale.
	• The student uses the Add Point tool to plot the solution to the system of equations.
	• The y-intercept of the equation the student will graph should be an integer.
	• Item difficulty can be adjusted via these example methods:
	  o Equation graphed by the student is in slope-intercept form with integer coefficients.
	  o Equation graphed by the student is in slope-intercept form with rational coefficients.
	  o Equation graphed by the student is in standard form with integer coefficients; slope is a rational number.
	  o Equation graphed by the student is in standard form with rational coefficients; slope is a rational number.
	
	TM3b
	Stimulus: The student is presented with a system of two linear equations. One of the equations is graphed.
	
	Example Stem: The graph of $2x - y = 4$ is shown.
	
	Use the Add Arrow tool to graph the equation $y = 3x - 2$ on the same coordinate plane. Use the Add Point tool to plot the solution to the system consisting of the two equations.
	
	
	
	Interaction: The student uses the [double] Add Arrow tool to graph a line on a grid. The student uses the Add Point tool to place a point on the graph.
	
	Rubric: (1 point) The student plots the line correctly and places a point on the point of intersection.
	
	Response Type: Graphing

Task Model 4
 	
Response Type: Multiple Choice, single correct response
 	
DOK Level 2
 	
8.EE.C.8b
Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
 	
Evidence Required:
4. The student recognizes when a system of two linear equations in two variables has one solution, no solution, or infinitely many solutions.
 	
Tools: Calculator
	Prompt Features: The student is prompted to identify if a system of linear equations has one solution, no solution, or infinitely many solutions.
	
	Stimulus Guidelines:
	• System of two linear equations in two variables with integer coefficients
	• Item difficulty can be adjusted via these example methods:
	    o Equations are written in the same form
	    o Equations are written in different forms
	    o The *x*- and *y*-coefficients are the same in both equations
	    o The *x*- and *y*-coefficients in one equation are whole number or fractional multiples of the coefficients in the other equation
	    o The coefficients in one equation are not multiples of the coefficients of the other equation
	    o The constant is the same in both equations
	    o The constant is different in each equation
	
	TM4
	Stimulus: The student is presented with two linear equations in two variables.
	
	Example Stem 1: A system of two linear equations has no solution. The first equation is $3x + y = -2$. Select the second equation that would make this system have no solution.
	
	A. $2x + y = 4$
	B. $2x + y = 5$
	C. $3x + y = 4$
	D. $4x + y = 5$
	
	Answer Choices: The correct answer is the linear equation in two variables that satisfies the given condition for the number of solutions. The distractors will be equations that yield other solution sets that do not satisfy the given condition.
	
	Rubric: (1 point) Correct answer is the linear equation in two variables that satisfies the given condition for the number of solutions (e.g., C).
	
	Response Type: Multiple Choice, single correct response

Task Model 4 **Response Type: Multiple Choice, single correct response** **DOK Level 2** **8.EE.C.8b** Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6. **Evidence Required:** 4. The student recognizes when a system of two linear equations in two variables has one solution, no solution, or infinitely many solutions. **Tools:** Calculator	**Example Stem 2:** Select the statement that correctly describes the solution to this system of equations. $3x + y = -2$ $x - 2y = 4$ A. There is no solution. B. There are infinitely many solutions. C. There is exactly one solution at (–2, –4). D. There is exactly one solution at (0, –2). **Answer Choices:** The correct answer is the statement that describes the solution to the system of equations such as "There are infinitely many solutions," "There is no solution" or "There is exactly one solution at (a, b)." The distractors will be statements that incorrectly describe the solution to the system of equation including "There is exactly one solution at (a, b)," where (a, b) is not a correct solution to the system of equations. **Rubric:** (1 point) Correct answer is the statement that describes the solution to the system of equations (e.g., D). **Response Type:** Multiple Choice, single correct response

Task Model 5
 	
Response Type:
Equation/Numeric
 	
DOK Level 2
 	
8.EE.C.8b
Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example,* $3x + 2y = 5$ *and* $3x + 2y = 6$ *have no solution because* $3x + 2y$ *cannot simultaneously be 5 and 6.*
 	
Evidence Required:
5. The student solves a system of two linear equations in two variables algebraically, or solves real-world and mathematical problems leading to two linear equations in two variables.
 	
Tools: Calculator
	Prompt Features: The student is prompted to solve a system of two linear equations in two variables.
	
	Stimulus Guidelines:
	• Systems of linear equations in two variables with one solution
	• Item difficulty can be adjusted via these example methods:
	  o The equations are written with integer coefficients:
	    ▪ Both equations are in slope-intercept form, $y = mx + b$, and $b = 0$ for at least one equation.
	  o The equations are written with integer coefficients:
	    ▪ Both equations are in slope-intercept form, $y = mx + b$, and $b \neq 0$.
	  o Both equations are in standard form with integer coefficients.
	  o Equations are in different forms with rational coefficients.
	
	TM5a
	Stimulus: Two linear equations in two variables with exactly one solution, where the student enters either the *x*-coordinate or the *y*-coordinate.
	
	Example Stem: Enter the *y* coordinate of the solution to this system of equations.
	
	$3x + y = -2$
	$x - 2y = 4$
	
	Rubric: (1 point) Student enters the correct numerical solution (e.g., −2).
	
	Response Type: Equation/Numeric

Task Model 5 **Response Type: Equation/Numeric** **DOK Level 2** **8.EE.C.8c** Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line though the first pair of points intersects the line through and second pair.* **Evidence Required:** 5. The student solves a system of two linear equations in two variables algebraically, or solves real-world and mathematical problems leading to two linear equations in two variables. **Tools:** Calculator	**Prompt Features:** The student is prompted to solve a real-world problem that can be solved using a system of two linear equations in two variables. **Stimulus Guidelines:** Item difficulty can be adjusted via these example methods: • Using integer values • Rational numbers expressed as positive or negative fractions or decimals to the tenths place. **TM5b** **Stimulus:** The student is presented with a real-world context that can be represented as a system of two linear equations in two variables. **Example Stem:** A tree that is 8 feet tall is growing at a rate of 1 foot each year. A tree that is 10 feet tall is growing at a rate of $\frac{1}{2}$ foot each year. Enter the number of years it will take the two trees to reach the same height. **Rubric:** (1 point) Student enters the correct numerical solution (e.g., 4). **Response Type:** Equation/Numeric