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: ○ 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. **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

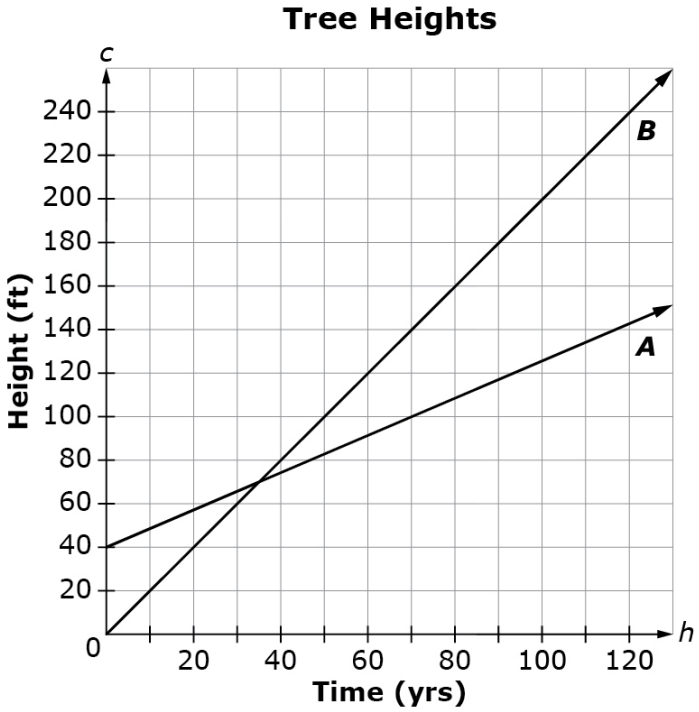
Prompt Features: The student identifies solutions to a system of two linear equations in two variables by locating points of intersection of their graphs.

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:
  - Point of intersection on graph is on intersecting grid lines.
  - 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).



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.

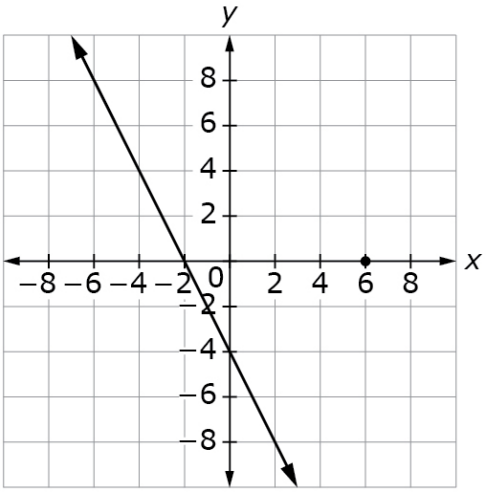
Stimulus Guidelines:

- 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:
  - Equation graphed by the student is in slope-intercept form with integer coefficients.
  - Equation graphed by the student is in slope-intercept form with rational coefficients.
  - Equation graphed by the student is in standard form with integer coefficients; slope is a rational number.
  - 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: ○ Equations are written in the same form ○ Equations are written in different forms ○ The *x*- and *y*-coefficients are the same in both equations ○ The *x*- and *y*-coefficients in one equation are whole number or fractional multiples of the coefficients in the other equation ○ The coefficients in one equation are not multiples of the coefficients of the other equation ○ The constant is the same in both equations ○ 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: ○ 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. ○ The equations are written with integer coefficients: ▪ Both equations are in slope-intercept form, $y = mx + b$, and $b \neq 0$. ○ Both equations are in standard form with integer coefficients. ○ 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