Task Model 1 **Response Type: Equation/Numeric** **DOK Level 2** **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.* **Evidence Required:** 1. The student creates one variable equations arising from linear, quadratic, simple rational, and exponential functions in one variable. **Tools:** Calculator	**Prompt Features:** The student is prompted to create an equation in one variable that can be used to solve a given problem. **Stimulus Guidelines:** • The student is presented with a contextual situation familiar to 16- to 17-year-olds that can be modeled by an equation in two or more variables that correspond to quantities given in the problem context. ○ The student may be given the equation and all but one of the values for the variables, or ○ The student may be given the same information without an equation and asked to represent the relationship between the quantities whose values are known and the unknown quantity with an equation. ○ The equations students are expected to enter are single-variable linear, quadratic, simple rational, or exponential equations. ○ Item difficulty can be adjusted via these example methods, but is not limited to these methods: ○ The form of the equation being created: ▪ is linear ▪ is quadratic ▪ is simple rational ▪ is exponential ○ The complexity of the contextual situation: ▪ The unknown quantity corresponds to one of the variables. ▪ The unknown quantity corresponds to an expression rather than a single variable in the anchoring multi-variable equation. **TM1** **Stimulus:** The student is presented with a contextual problem. **Example Stem 1:** Consider the given equation that models a train's distance from its departing station, where: • *y* represents the distance in miles, • *x* represents the speed of the train in miles per hour, and • *t* represents the time traveled from the departing station in hours. $y = xt$ Enter an equation for which the solution is the speed of the train, in miles per hour, where the train's distance from the departing station is 162 miles and it has traveled for 3 hours. **Rubric:** (1 point) The student correctly enters an equation (e.g., 162=3*x* or any equation equivalent to $x = 54$). **Response Type:** Equation/Numeric

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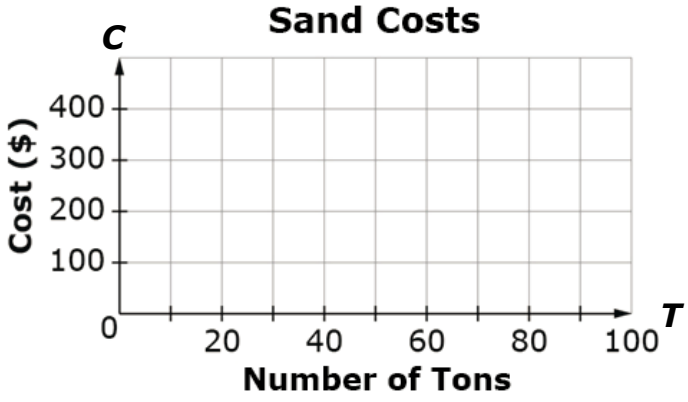
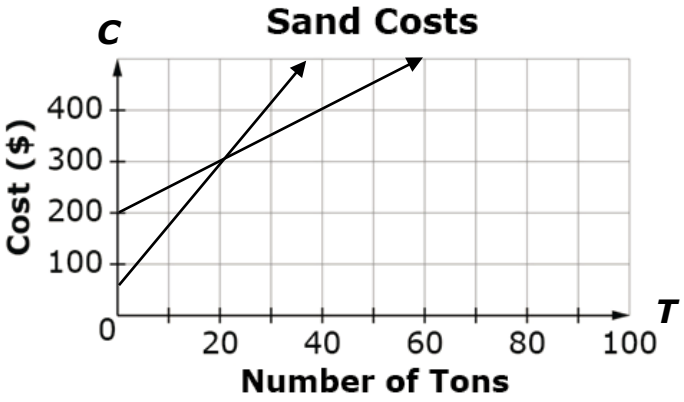
Task Model 2 **Response Type: Equation/Numeric** **DOK Level 2** **A-CED.A.1** Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions and simple rational and exponential functions.* **Evidence Required:** 2. The student creates one variable inequalities arising from linear, quadratic, simple rational, and exponential functions in one variable. **Tools:** Calculator	**Prompt Features:** The student is prompted to create a one-variable inequality that can be used to solve a given problem. **Stimulus Guidelines:** • The student is presented with a contextual situation familiar to 16- to 17-year-olds that can be modeled by an inequality in two or more variables that correspond to quantities given in the problem context. ○ The student may be given the inequality and all but one of the values for the variables, or ○ The student may be given the same information without an inequality and asked to represent the relationship between the quantities whose values are known and the unknown quantity with an inequality. ○ The inequalities students are expected to enter are single-variable linear, quadratic, or simple rational equations. • Item difficulty can be adjusted via these example methods, but is not limited to these methods: ○ The form of the inequality being created: ▪ is linear ▪ is quadratic ▪ is simple rational ○ The complexity of the contextual situation: ▪ The unknown quantity corresponds to one of the variables. ▪ The unknown quantity corresponds to an expression rather than a single variable in the anchoring multi-variable inequality. **TM2** **Stimulus:** The student is presented with a contextual situation that can be represented by an inequality. **Example Stem 1:** A clerk earns $125 per day, plus a commission equal to 10% of her sales, *s*. The clerk earns less than $180 on Monday. Enter an inequality that represents all possible values for the clerk's sales, *s*, on Monday. **Rubric:** (1 point) The student correctly enters the inequality (e.g., inequality equivalent to $0.1s + 125 < 180$). **Example Stem 2:** A rectangular garden measuring 13 meters by 15 meters is to have a gravel pathway of constant width built all around it. There is enough gravel to cover 80 square meters or less. Enter an inequality that represents all possible widths (w), in meters, of the pathway. **Rubric:** (1 point) The student correctly enters an inequality equivalent to $(13 + 2w)(15 + 2w) - 13(15) \leq 80$. **Response Type:** Equation/Numeric

Task Model 3 **Response Type: Graphing** **DOK Level 2** **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. **Evidence Required:** 3. The student graphs equations on the coordinate axes with labels and scales to represent the solution to a contextual problem. **Tools:** Calculator **Accessibility Note:** Graphing 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 graph of an equation in two variables from a contextual situation. **Stimulus Guidelines:** • The student is presented with a contextual situation familiar to 16- to 17-year-olds that can be modeled by an equation in two or more variables that correspond to quantities given in the problem context. ○ The student may be given the equation and all but two of the values for the variables, or ○ The student may be given the same information without an equation and asked to represent the relationship between the quantities whose values are known and the unknown quantities with an equation. ○ The student is asked to sketch the graph of the equation. ○ Item difficulty can be adjusted via these example methods, but is not limited to these methods: ○ The form of the equation being created: ▪ is linear ▪ is quadratic ▪ is simple rational ▪ is exponential **TM3** **Stimulus:** The student is presented with a contextual situation and a labeled coordinate grid. **Example Stem:** An elementary school is having sand delivered for the playground. Sadie's Sand charges $5.00 per ton of sand plus a delivery fee of $200. Greg's Sand Pit charges $12.00 per ton of sand plus a delivery fee of $50. Use the Add Arrow tool to represent functions that show the cost *C* of buying *T* tons of sand from each company.  **Interaction:** The student uses the Add arrow tool to graph the functions represented in the context. **Rubric:** (1 point) The student correctly graphs the functions.



Response Type: Graphing

Task Model 4 **Response Type: Equation/Numeric** **DOK Level 1** **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. **Evidence Required:** 4. The student creates equations in two or more variables to represent relationships between quantities. **Tools:** Calculator **Version 3 Update:** Retired TM4 example stem 2	**Prompt Features:** The student is prompted to create an equation in two or more variables that can be used to solve a given problem. **Stimulus Guidelines:** • The student is presented with a contextual situation familiar to 16- to 17-year-olds that can be modeled by an equation in two or more variables that correspond to quantities given in the problem context. ○ The student may be given the equation and all but two of the values for the variables, or ○ The student may be given the same information without an equation and asked to represent the relationship between the quantities whose values are known and the unknown quantities with an equation. ○ Item difficulty can be adjusted via these example methods, but is not limited to these methods: ○ The form of the equation being created: ▪ is linear ▪ is quadratic ▪ is simple rational ▪ is exponential ○ The number of variables in the equation **TM4** **Stimulus:** The student is presented with a contextual situation. **Example Stem:** Malik and Nora are playing a video game. • Malik starts with *m* points and Nora starts *n* points. • Then Malik gets 150 more points, while Nora loses 50 points. • Finally, Nora gets a bonus and her score is doubled. • Nora now has 50 more points than Malik. Enter an equation that represents the relationship between *m* and *n* given the information above. **Rubric:** (1 point) The student correctly enters the equation (e.g., equation equivalent to $2(n-50)=(m+150)+50$). **Response Type:** Equation/Numeric