HS Mathematics Item Specification C1 TG



Task Model 1	Prompt Features: The student is prompted to create an equation
	in one variable that can be used to solve a given problem.
Response Type:	
Equation/Numeric	Stimulus Guidelines:
-	The student is presented with a contextual situation familiar to
DOK Level 2	16- to 17-year-olds that can be modeled by an equation in two
	or more variables that correspond to quantities given in the
A-CED.A.1	problem context.
Create equations and	• The student may be given the equation and all but one of
inequalities in one	the values for the variables, or
variable and use	• The student may be given the same information without an
them to solve	equation and asked to represent the relationship between
problems. <i>Include</i>	the quantities whose values are known and the unknown
equations arising	quantity with an equation.
from linear and	• The equations students are expected to enter are single-
guadratic functions	variable linear, guadratic, simple rational, or exponential
and simple rational	equations.
and exponential	 Item difficulty can be adjusted via these example methods, but
functions.	is not limited to these methods:
	\circ The form of the equation being created:
Evidence Required:	• is linear
1. The student	 is quadratic
creates one variable	 is simple rational
equations arising	 is exponential
from linear,	 The complexity of the contextual situation:
quadratic, simple	 The unknown quantity corresponds to one of the
rational, and	variables.
exponential functions	 The unknown quantity corresponds to an expression
in one variable.	rather than a single variable in the anchoring multi-
	variable equation.
Tools: Calculator	
	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
	• <i>t</i> 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=3x or any equation equivalent to $x = 54$)
	$-2-2$ s. of any equation equivalent to $\lambda = 0.1$
	Response Type: Equation/Numeric

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Task Model 1	Example Stem 2: Consider the equation that gives the minimum
Response Type: Equation/Numeric	 stopping distance, d, in feet, for an automobile, where: v represents the automobile speed, in feet per second, s represents the driver's response time, in seconds, to apply the brakes, and
DOK Level 2	 <i>m</i> represents the coefficient of friction between the tires and the road
A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. <i>Include</i> <i>equations arising</i> <i>from linear and</i> <i>quadratic functions</i> <i>and simple rational</i> <i>and exponential</i> <i>functions.</i>	Enter an equation for which the solution is the speed, in feet per second, of an automobile with a stopping distance of 200 feet, a driver's response time of 0.5 second, and a coefficient of friction equal to 0.8. Rubric: (1 point) The student correctly enters an equation (e.g., equation equivalent to $200 = 0.5v + \frac{v^2}{51.2}$).
Evidence Required: 1. The student creates one variable equations arising from linear, quadratic, simple rational, and exponential functions in one variable. Tools: Calculator	Example Stem 3: A sales clerk's daily earnings include \$125 per day plus commission equal to <i>x</i> percent of his daily sales. Enter an equation that can be used to find the commission percentage (<i>x</i>), if the clerk's daily sales are \$1375 and his total earnings for that day are \$180. Rubric: (1 point) The student correctly enters an equation [e.g., $125 + \frac{x}{100} \cdot 1375 = 180$ or equivalent].
	Example Stem 4: Jim can paint a house in 12 hours. Alex can paint the same house in 8 hours.
	Enter an equation that can be used to find the time in hours, t, it would take Alex and Jim to paint the house together assuming they both work at the rates they work when working alone.
	Rubric: (1 point) The student correctly enters an equation (e.g., $\frac{1}{12} + \frac{1}{8} = \frac{1}{t}$ or equivalent).
	Response Type: Equation/Numeric



Task Model 2	Prompt Features: The student is prompted to create a one-
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	 Stimulus Guidelines: 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
problems. Include equations arising from linear and quadratic functions and simple rational and exponential functions. Evidence Required:	 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 multivariable inequality. TM2 Stimulus: The student is presented with a contextual situation that can be represented by an inequality.
2. The student creates one variable inequalities arising from linear, quadratic, simple rational, and exponential functions in one variable.	
Tools: Calculator	Example Stem 1: A clerk earns \$125 per day, plus a commission equal to 10% of her sales, <i>s</i> . 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 $(13 + 2w)(15 + 2w) - 13(15) \le 80$.
	Response Type: Equation/Numeric



Task Model 3	Prompt Features: The student is prompted to create a graph of an
	equation in two variables from a contextual situation.
Response Type:	
Graphing	Stimulus Guidelines:
	Ihe student is presented with a contextual situation familiar
DOK Level 2	to 16- to 17-year-olds that can be modeled by an equation
	in two or more variables that correspond to quantities given
A-CED.A.2	In the problem context.
two or more veriables	• The student may be given the equation and all but
to represent	The student may be given the same information
relationshins between	without an equation and asked to represent the
quantities: granh	relationship between the quantities whose values are
equations on	known and the unknown quantities with an equation
coordinate axes with	 The student is asked to sketch the graph of the
labels and scales	equation
	 Item difficulty can be adjusted via these example methods.
Evidence Required:	but is not limited to these methods:
	• The form of the equation being created:
3. The student graphs	 is linear
equations on the	 is quadratic
coordinate axes with	 is simple rational
labels and scales to	 is exponential
represent the solution	
to a contextual	ТМЗ
problem.	Stimulus: The student is presented with a contextual
	situation and a labeled coordinate grid.
Tools: Calculator	
	Example Stem: An elementary school is having sand delivered for
Craphing itoms are	the playground. Sadie's Sand charges \$5.00 per ton of sand plus a
not currently able to	delivery fee of \$200. Greg's Sand Pit charges \$12.00 per ton of
he Brailled Minimize	sand plus a delivery lee of \$50.
the number of items	Use the Add Arrow tool to represent functions that show the cost C
developed to this TM.	of buying T tons of sand from each company
	Sand Costs
	C Sand Costs
	4 00
	() 300
	8 200
	Ŭ 100
	100
	$ \begin{bmatrix} & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & &$
	Number of Tons
	Interaction: The student uses the Add arrow tool to graph the
	Tunctions represented in the context.
	Rubric
	(1 point) The student correctly graphs the functions.

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HS Mathematics Item Specification C1 TG Task Model 4 Prompt Features: The student is pr



lask Model 4	Prompt reatures: The student is prompted to create an equation
	In two or more variables that can be used to solve a given problem.
Response Type:	
Equation/Numeric	Stimulus Guidelines:
	 The student is presented with a contextual situation familiar
DOK Level 1	to 16- to 17-year-olds that can be modeled by an equation
	in two or more variables that correspond to quantities given
A-CED.A.1	in the problem context.
Create equations and	\circ The student may be given the equation and all but
inequalities in one	two of the values for the variables, or
variable and use	• The student may be given the same information
them to solve	without an equation and asked to represent the
problems Include	relationship between the quantities whose values are
equations arising	known and the unknown quantities with an equation
from linear and	 Item difficulty can be adjusted via these example methods
quadratic functions	but is not limited to those methods:
and simple rational	The form of the equation being created
and experiential	
functions	
runctions.	
Fuidanas Daminada	 Is simple rational
Evidence Required:	
4. The student	 The number of variables in the equation
creates equations in	
two or more variables	TMA
to represent	Stimulua . The student is presented with a contextual situation
relationships between	
quantities.	Franciska Otama Maliland Nama and alaring a cidea arms
	Example Stem: Malik and Nora are playing a video game.
Tools: Calculator	Malik starts with m points and Nora starts p points
	Then Malik acts 150 mere points while Ners losse 50 points.
Version 3 Update:	Their Malik gets 150 more points, while word loses 50 points. Finally, Ners gets a banus and her seers is doubled.
Retired TM4 example	• Finally, Nora gets a bonus and her score is doubled.
stem 2	• Nora now has 50 more points than Malik.
	Enter an equation that represents the relationship between <i>m</i> and <i>n</i>
	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