

<b>HS Mathematics Iten</b>	n Specification C1 TI

Task Model 1	Prompt Features: The student is prompted to solve a linear
	equation in one variable.
Response Type:	
Equation/Numeric	Stimulus Guidelines:
DOK Level 1	<ul> <li>The student is presented with a linear equation in one variable with rational coefficients.</li> <li>The solution must be rational. If the student reports the</li> </ul>
A-REI.B.3	solution as a decimal, it should be rounded to the nearest
and inequalities in one variable, including equations with coefficients represented by letters.	<ul> <li>Equations should use a variety of letters for the variable.</li> <li>Item difficulty can be varied by adjusting the number of steps involved in solving equations, as well as the use of parentheses.</li> </ul>
-	TM1
<b>Evidence Required:</b> 1. The student understands that the factored form of a quadratic expression reveals the zeroes of the function it defines.	<b>Stimulus:</b> The student is presented with a one-variable, linear equation with rational solution and rational coefficients. <b>Example Stem 1:</b> Enter the value for <i>t</i> that makes the given equation true. 48 = t - 3
Tools: None	
Version 3 Update: Revised TM1a to allow for multi-step equations. Retired TM1b. Renamed TM1a as TM1.	<b>Example Stem 2:</b> Enter the value for x that makes the given equation true. 20x - 5(6x + 4) = 4x - 6 <b>Rubric:</b> (1 point) The student enters the correct value for the variable x (e.g., 51; -1). <b>Response Type:</b> Equation/Numeric



Task Model 2	<b>Prompt Features:</b> The student is prompted to solve a linear inequality in one variable with rational coefficients.
Response Types: Equation/Numeric; Multiple Choice, single correct response DOK Level 1	<ul> <li>Stimulus Guidelines:</li> <li>The student is presented with a linear inequality in one variable with rational coefficients.</li> <li>Inequalities should use a variety of letters for the variable.</li> <li>Item difficulty can be varied by adjusting the number of steps involved in finding the solution set for the inequality, as well as the use of parentheses.</li> </ul>
<b>A-REI.B.3</b> Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	<b>TM2a</b> <b>Stimulus:</b> The student is presented with a one-variable linear inequality with rational coefficients. <b>Example Stem 1:</b> Solve the inequality for <i>n</i> . $45 \ge -15n$ .
<b>Evidence Required:</b> 2. The student solves linear inequalities in one variable with numeric coefficients.	<b>Example Stem 2:</b> Solve the inequality for $w$ . -2w + 17 < 13.
Tools: None	<b>Rubric:</b> (1 point) The student enters the correct solution to the inequality (e.g., $n \ge -3$ ; $w \ge 2$ ).
Version 3 Update: Revised TM2a and TM2b to allow for multi- step inequalities. Retired TM2c and TM2d.	Response Type: Equation/Numeric TM2b Stimulus: The student is presented with a one-variable linear inequality with rational coefficients.
	<b>Example Stem:</b> Which inequality represents all possible solutions of $-3n < 12$ ?
	A. <i>n</i> < -36 B. <i>n</i> < -4 C. <i>n</i> > -36 D. <i>n</i> > -4
	<b>Rubric:</b> (1 point) The student selects the correct option (e.g., D).
	Response Type: Multiple Choice, single correct response



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Task Model 3	<b>Prompt Features:</b> The student is given an equation with more
Pesnonse Tyne:	than one variable that is linear in one of the variables. The student
Equation/Numeric	is asked to solve for that variable in terms of the other variables.
	Stimulus Guidelines:
DOK Level 1	The equation has multiple variables and is linear in one of
	more of those variables. The student is given values for the
A-REI.B.3	other variables.
and inequalities in one	• The solution must be rational. If the student reports the solution as a decimal, it should be rounded to the nearest
variable, including	tenth.
equations with	• Equations should use a variety of letters for the variable.
coefficients represented	<ul> <li>Item difficulty can be varied by adjusting the number of</li> </ul>
by letters.	steps involved in solving equations, as well as the use of
Evidence Required	parentheses.
3 The student solves	TM3a
linear inequalities in	<b>Stimulus:</b> The student is presented with an equation in more than
one variable with letter	one variable and is given all values for the other variables.
coefficients or identifies	
appropriate value(s) of	<b>Example Stem 1:</b> For the given equation, enter the value of <i>B</i>
a letter coefficient given	when $x = 10$ .
about a variable in a	<i>Bx</i> = 20
linear equation or	
inequality.	
	<b>Example Stem 2:</b> For the given equation, enter the value of <i>B</i>
loois: None	when $x = -\frac{1}{5}$ .
Version 3 Update:	D
Revised TM3a to allow	$\frac{b}{r} = 20$
for multi-step solving.	~
Retired TM3b and	<b>Example Stem 3:</b> For the given equation, enter the value of C
IM30.	when $F = 77$ .
	F <sup>9</sup> C + 22
	$F = \frac{1}{5}C + 32$
	Bubric:
	(1 point) The student enters the correct value for B (e.g., 2; -4;
	25).
	Response Type: Equation/Numeric



Task Model 3 Response Type: Equation/Numeric	<b>Prompt Features:</b> The student is given an equation with more than one variable that is linear in one of the variables. The student is asked to solve for that variable in terms of the other variables.
DOK Level 2 A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by lottors	<ul> <li>Stimulus Guidelines:</li> <li>The equation has multiple variables and is linear in one of more of those variables.</li> <li>Item difficulty can be varied by adjusting the number of steps involved in solving equations, as well as the use of parentheses.</li> </ul>
by letters.	requiring at least two stops to solve
<b>Evidence Required:</b> 3. The student solves linear inequalities in one variable with letter	<b>Example Stem1:</b> Solve the given equation for <i>a</i> in terms of <i>v</i> and <i>t</i> .
coefficients or identifies appropriate value(s) of a letter coefficient given specific	$v = \frac{1}{2}at^2$
information about a variable in a linear equation or inequality.	<b>Example Stem2:</b> Solve the given equation for <i>w</i> in terms of <i>P</i> and <i>I</i> .
	P = 2l + 2w
Tools: None	
Version 3 Update: Revised TM3c example stems to focus on more realistic formulas.	<b>Rubric:</b> (1 point) The student enters the correct equation (e.g., $a = \frac{2v}{t^2}$ ; $w = \frac{P}{2} - l$ ). <b>Response Type:</b> Equation/Numeric



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Task Model 4	Prompt Features: The student is prom	pted to solve a quadratic
Bosnonco Tyrou	equation presented in various forms.	
Equation/Numeric	Stimulus Guidelines:	
-444400, 114110110	<ul> <li>Item difficulty can be adjusted v</li> </ul>	ia these example methods,
DOK Level 2	but are not limited to these met	nods:
	<ul> <li>The quadratic equation us</li> <li>have rational roots</li> </ul>	
A-KEI.B.4 Solve quadratic	<ul> <li>irrational roots</li> </ul>	-
equations in one	<ul> <li>complex roots</li> </ul>	
variable.	тма	
	<b>Stimulus:</b> The student is presented wit	h a quadratic equation in
Evidence Required:	one variable in various forms (e.g., $ax^2$	$+ bx + c = dx^2 + ex + f,$
quadratic equations in	$a(x-r_1)(x-r_2) = dx^2 + ex + f$ , etc.).	
one variable by taking	<b>Example Stem 1:</b> Solve the following e	equation for <i>n</i> .
square roots,		
completing the square,	$n^2 = 49$	
formula, or by	Enter one solution in the first box. If the	ere are two solutions,
factoring.	enter the second solution in the second	box.
	Example Stom 2. Colve the following	austion for t
Tools: None	Example Stem 2: Solve the following a	
TOOIS: None	$18t^2 + 50 = 0$	
Version 3 Update:	Enter one solution in the first box. If the	are are two solutions
Retired TM4a-TM4f and	enter the second solution in the second	box.
for complex solutions		
and quadratic	<b>Example Stem 3:</b> Solve the following e	equation for x.
equations in different	$x^2 - 10x + 45 = 4x$	
forms. Rather than		
solve problems using a	Enter one solution in the first box. If the	ere are two solutions,
particular method,	enter the second solution in the second	DOX.
equations are	Example Stem 4: Solve the following e	equation for w.
flexible strategies.		
	$2w^2 - 16w = -32$	
	Enter one solution in the first box. If the	ere are two solutions,
	enter the second solution in the second	box.
	Dubric	
	(1 point) The student correctly enters the	ne solution(s) to the
	equation (e.g., $n = 7, -7; t = -\frac{5}{2}i, \frac{5}{2}i; 2$	$\kappa = 9, 5; w = 4,).$
	3 3 3	,
	Response Type: Equation/Numeric (tw	vo response boxes)



Task Model 5	Prompt Features: The student is prompted to identify a
	quadratic equation that has no real solutions.
Response Type:	
Equation/Numeric	Stimulus Guidelines:
	<ul> <li>All quadratic equations for this task model must have</li> </ul>
DOK Level 2	complex solutions.
	• Item difficulty can be adjusted via these example methods,
A-REI.B.4	but are not limited to these methods:
Solve quadratic	<ul> <li>Students are asked to identify a quadratic</li> </ul>
equations in one	equation with complex solutions, multiple
variable.	choice.
	• The form of the quadratic equation can be:
Evidence Required:	• standard form, $ax^2 + bx + c = 0$
5. The student	• Vertex form, $f(x) = a(x - h)^2 + k$
recognizes when the	$(e.g., 5(x-3)^2 + 10 = 0).$
quadratic formula	• other non-standard forms such as: $\pm bx \pm c =$
enters complex	$\pm ax^2$ , $\pm c \pm ax^2 = \pm bx$ or $\pm ax^2 \pm bx = \pm c$
solutions.	$(e.g., 6x - 23 = 3x^2).$
	TM5a
Tools: None	<b>Stimulus:</b> The student is presented with a quadratic equation in
Development Note:	one variable where one of the coefficients is given as a parameter.
No more than 5% of	<b>Example Stop 1:</b> Consider the equation $x^2 + bx + 0 = 0$ where b
this target should come	<b>Example Stem 1.</b> Consider the equation $x^2 + bx + y = 0$ where b
from this task model	real solutions
TM5a.	
	Rubric
Version 3 Update:	(1 point) The student enters a correct value for $b$ (e.g., -6< $b$ <6).
Separated evidence	
required statements 5	
and 6 into separate	<b>Response Type:</b> Equation/numeric
task models (TM5 and	
TM6). Renamed TM5b	<b>Example Stem 2:</b> Consider the equation $(x + 3)^2 + k = 0$ where k
as IM6.	is a real number. Enter a value for $k$ so that the equation has no
	real solutions.
	Rubric:
	(1 point) The student enters a correct value for $k$ (e.g., $-0 < k$ ).
	Response Type: Equation/numeric



Task Model 6	<b>Prompt Features:</b> The student is prompted to solve a quadratic
	equation that has complex solutions.
Response Type:	
Multiple Choice,	Stimulus Guidelines:
single correct	<ul> <li>All quadratic equations for this task model must have</li> </ul>
response	complex solutions.
	• Item difficulty can be adjusted via these example methods,
DOK Level 2	but are not limited to these methods:
	<ul> <li>Students are asked to identify a quadratic</li> </ul>
A-REI.B.4	equation with complex solutions, multiple
Solve quadratic	choice.
equations in one	• The form of the quadratic equation can be:
variable.	• standard form, $ax^2 + bx + c = 0$
	• vertex form, $f(x) = a(x - h)^2 + k$ (e.g., $5(x - h)^2$
Evidence Required:	$(3)^2 + 10 = 0).$
E The student enters	• other non-standard forms such as: $+bx + c =$
6. The student enters	$+ax^{2}$ , $+c + ax^{2} = +bx$ or $+ax^{2} + bx = +c$ (e.g.,
the guadratic formula	$6x - 23 = 3x^2$ ).
in the form of his where	
In the form $a \pm bi$ where	ТМ6
	<b>Stimulus:</b> The student is given a quadratic equation with complex
numbers.	roots in standard form : $ax^2 + bx + c = 0$
Tools: None	<b>Example Stem:</b> What are the solutions for the given equation?
Version 3 Update:	$x^2 + 4x + 16 = 0$
Separated evidence	
required statements 5	A. $x = -2 \pm 4i\sqrt{3}$
and 6 into separate	B. $x = -2 \pm 2\sqrt{3}$
task models (TM5 and	C. $x = -2 + 2i\sqrt{3}$
IM6). Renamed IM5D	
THE	D. $x = -2 + 4\sqrt{3}$
as TM6.	D. $x = -2 \pm 4\sqrt{3}$
as TM6.	D. $x = -2 \pm 4\sqrt{3}$ Rubric:
as TM6.	D. $x = -2 \pm 4\sqrt{3}$ <b>Rubric:</b> (1 point) The student selects the correct option (e.g., C).
as TM6.	D. $x = -2 \pm 4\sqrt{3}$ <b>Rubric:</b> (1 point) The student selects the correct option (e.g., C).
as TM6.	D. $x = -2 \pm 4\sqrt{3}$ <b>Rubric:</b> (1 point) The student selects the correct option (e.g., C). <b>Response Type:</b> Multiple Choice, single correct response



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Task Model 7	<b>Prompt Features:</b> variable, identify equ	Given a uivalent	linear c t equatio	or quadratic equation in one ons.
Response Type: Equation/Numeric	Stimulus Guideline	es:		
DOK Level 2	<ul> <li>The student i equation in o</li> <li>The student i</li> </ul>	s prese ne varia must ide	nted wit able and entify w	h a linear or quadratic another set of equations. hich of the equations in the set
A-REI.B.4 Solve quadratic	are equivaler	it to the	e first.	
equations in one variable.	TM7 Stimulus: The stem	will pro	esent a	linear or quadratic equation in
<b>Evidence Required:</b> 7. The student recognizes equivalent equations to given linear or quadratic equations in one variable.	should be likely to a the given equation t equivalent equations structural compariso manipulations of the equations.	rise fror hat proo s should ons of th equations	m comm duce eq d be clea ne two e ons that	ations. Equivalent equations foon algebraic manipulations of uivalent equations. Non- arly not equivalent based on quations or algebraic give rise to non-equivalent
Tools: None	Example Stem 1: E solution set. Select Y equivalent to this eq	Equivale Yes or N Juation:	ent equa No to ind 4x + 3 =	tions have exactly the same licate whether each equation is $=\frac{5}{2}x - 7$
Version 3 Undate:				2
Added new evidence required statement 7 and new TM7.	Equation $4x = \frac{5}{2}x - 4$	Yes	No	
	8x + 3 = 5x - 7			
	$4x = \frac{5}{2}x - 10$			
	<b>Example Stem 2:</b> E solution set. Select Select equivalent to this eq	Equivale Yes or N Juation:	ent equa No to ind $t^2 + 5t$	tions have exactly the same licate whether each equation is + 6 = 0
	Equation	Yes	No	
	$0 = t^2 + 5t + 6$			_
	(t+2)(t+3) = 0			
	t(t+5+6)=0			
	Rubric: (1 point) Th	ne stude	ent corre	ectly determines whether each

equation is equivalent to the first (e.g., NNY; YYN).

**Response Type:** Matching Tables



Task Model 7

**Example Stem 3:** Equivalent equations have exactly the same solution set. Select Yes or No to indicate whether each of the following equations is equivalent to the given equation.

 $y^2 + 2y + 1 = 9$ 

	-	
DOK	Level	2

Response Type: Matching Tables

**A-REI.B.4** Solve quadratic equations in one variable.

#### **Evidence Required:**

7. The student recognizes equivalent equations to given linear or quadratic equations in one variable.

Tools: None

#### Version 3 Update:

Added new evidence required statement 7 and new TM7.

Equation	Yes	No
$(y+1)^2 = 3^2$		
(y + 1) = 3		
<i>y</i> = 2		

**Rubric:** (1 point) The student correctly determines whether each equation is equivalent to the first (e.g., YNN).

Response Type: Matching Tables