Algebraic Reasoning Unit 0

Summative Assessment

2017-2018 Algebra I EOC

Released Test Items

Aligned to the Standards

Linear Functions

A.2 Linear functions, equations, and inequalities. The student applies the mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations.

A.3 Linear functions, equations, and inequalities. The student applies the mathematical process standards when using graphs of linear functions, key features, and related transformations to represent in multiple ways and solve, with and without technology, equations, inequalities, and systems of equations.

Connected Knowledge and Skills A.4, A.5, A.12

A.2(A) determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities	Analysis of Assessed Standards

Q1

What are the domain and range of $f(x) = -37$?

A Domain: All real numbers greater than or equal to -37
Range: All real numbers

B Domain: $\{-37\}$
Range: All real numbers

C Domain: All real numbers
Range: All real numbers greater than or equal to -37

D Domain: All real numbers
Range: $\{-37\}$

Cluster	Linear Functions
Subcluster	Describing Linear Functions
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes
Instructional Implications

A.2(A) determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities

Analysis of Assessed Standards

Q2

The daily cost of hiring a plumber, *y*, to work *x* hours on a repair project can be modeled using a linear function. The plumber charges a fixed cost of $80 plus an additional cost of $45 per hour. The plumber works a maximum of 8 hours per day.

For one day of work, what is the range of the function for this situation?

A $0 \leq x \leq 8$

B $80 \leq y \leq 440$

C $0 \leq x \leq 10$

D $45 \leq y \leq 685$

Cluster	Linear Functions
Subcluster	Describing Linear Functions
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes
Instructional Implications

A.2(A) determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities

Analysis of Assessed Standards

Q3

A set of weights includes a 4 lb barbell and 6 pairs of weight plates. Each pair of plates weighs 20 lb. If *x* pairs of plates are added to the barbell, the total weight of the barbell and plates in pounds can be represented by $f(x) = 20x + 4$.

What is the range of the function for this situation?

A {0, 1, 2, 3, 4, 5, 6}

B {4, 24, 44, 64, 84, 104, 124}

C {0, 2, 4, 6}

D {4, 44, 84, 124}

Cluster	Linear Functions
Subcluster	Describing Linear Functions
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes
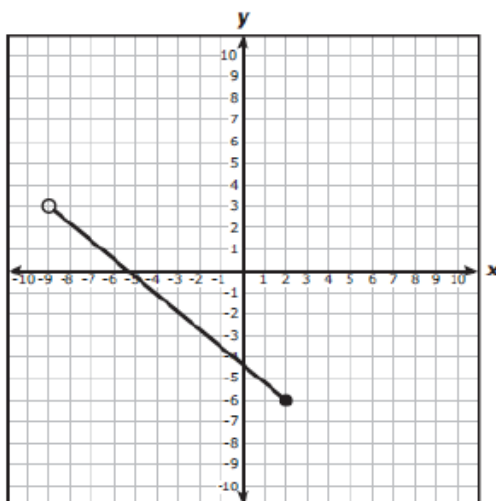Instructional Implications

A.2(A) determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities	Analysis of Assessed Standards	

!

Q4

The graph of part of linear function *g* is shown on the grid.

Which inequality best represents the domain of the part shown?

F $-9 < x \leq 2$

G $-9 \leq x < 2$

H $-6 < g(x) \leq 3$

J $-6 \leq g(x) < 3$

Cluster	Linear Functions
Subcluster	Describing Linear Functions
Content	Readiness
Process	
Stimulus	

Data Analysis

Item	State	Local	Error Analysis
F*	61		☐ Guessing
G	18		☐ Careless Error
			☐ Stopped Too Early
H	11		☐ Mixed Up Concepts
J	9		

Learning from Mistakes
Instructional Implications

A.2(B) write linear equations in two variables in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points	Analysis of Assessed Standards	

Q5

What is the equation in slope-intercept form of the line that passes through the points $(-4, 47)$ and $(2, -16)$?

A $y = -\dfrac{21}{2}x + \dfrac{979}{21}$

B $y = -\dfrac{2}{21}x + \dfrac{979}{21}$

C $y = -\dfrac{21}{2}x + 5$

D $y = -\dfrac{2}{21}x + 5$

Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Supporting
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.2(C) write linear equations in two variables given a table of values, a graph, and a verbal description

Q6

At a restaurant jars of tomato sauce are stored in boxes in the pantry. Each box contains 8 jars of tomato sauce. A cook uses 2 jars from 1 of the boxes.

Which function shows the relationship between y, the total number of jars of tomato sauce remaining in the pantry, and x, the number of boxes in the pantry?

A $y = 8x + 6$

B $y = 8x$

C $y = 8x - 2$

D $y = 6x$

Analysis of Assessed Standards	
Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

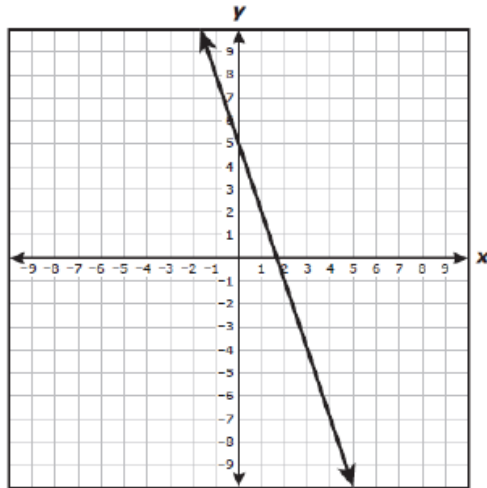| Learning from Mistakes Instructional Implications |
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A.2(C) write linear equations in two variables given a table of values, a graph, and a verbal description	Analysis of Assessed Standards	

Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Readiness
Process	
Stimulus	

Q7

The graph of a linear function is shown on the grid.

Which equation is best represented by this graph?

A $y + 7 = -3(x - 4)$

B $y + 1 = -3(x + 2)$

C $y - 4 = 3(x + 7)$

D $y - 2 = 3(x - 1)$

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.2(C) write linear equations in two variables given a table of values, a graph, and a verbal description	Analysis of Assessed Standards	

Q8

Researchers in Antarctica discovered a warm sea current under a glacier that is causing the glacier to melt. The ice shelf of the glacier had a thickness of approximately 450 m when it was first discovered. The thickness of the ice shelf is decreasing at an average rate of 0.06 m per day.

Which function can be used to find the thickness of the ice shelf in meters x days since the discovery?

A $t(x) = 450 - 0.06x$

B $t(x) = -0.06(x + 450)$

C $t(x) = 450 + 0.06x$

D $t(x) = 0.06(x + 450)$

Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.2(C) write linear equations in two variables given a table of values, a graph, and a verbal description	Analysis of Assessed Standards	

Q9

The table represents some points on the graph of a linear function.

x	y
−20	−268
−14	−196
−8	−124
−1	−40

Which equation represents the same relationship?

F $y + 268 = \dfrac{1}{12}(x + 20)$

G $y + 20 = \dfrac{1}{12}(x + 268)$

H $y + 268 = 12(x + 20)$

J $y + 20 = 12(x + 268)$

Analysis of Assessed Standards	
Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis ☐ Guessing ☐ Careless Error ☐ Stopped Too Early ☐ Mixed Up Concepts
F			
G			
H			
J			

Learning from Mistakes
Instructional Implications

A.2(F) write the equation of a line that contains a given point and is perpendicular to a given line	Analysis of Assessed Standards	

Q10

39 What is the equation in slope-intercept form of the line that passes through the point $(2, -2)$ and is perpendicular to the line represented by $y = \frac{2}{5}x + 2$?

A $y = \frac{5}{2}x - 7$

B $y = \frac{5}{2}x + 7$

C $y = -\frac{5}{2}x - 3$

D $y = -\frac{5}{2}x + 3$

Analysis of Assessed Standards	
Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Supporting
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

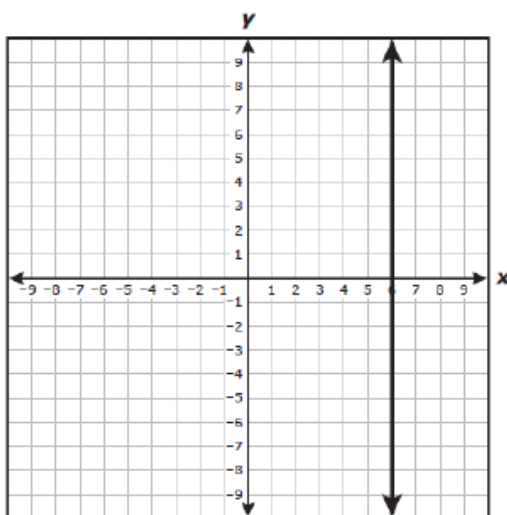| **A.2(G)** write an equation of a line that is parallel or perpendicular to the x- or y- axis and determine whether the slope of the line is zero or undefined	Analysis of Assessed Standards	

<table>
<tr><td rowspan="8">

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Q11

What are the equation and slope of the line shown on the grid?

F $y = 6$; slope is $-\dfrac{1}{6}$.

G $x = 6$; slope is zero.

H $y = 6$; slope is 6.

J $x = 6$; slope is undefined.

</td></tr>
<tr><td>Cluster</td><td>Linear Functions</td></tr>
<tr><td>Subcluster</td><td>Writing Linear Equations</td></tr>
<tr><td>Content</td><td>Supporting</td></tr>
<tr><td>Process</td><td></td></tr>
<tr><td>Stimulus</td><td></td></tr>
<tr><td colspan="2" align="center">Data Analysis</td></tr>
<tr><td colspan="2">

Item			Error Analysis ☐ Guessing
F			☐ Careless Error ☐ Stopped Too Early
G			☐ Mixed Up Concepts
H			
J			

Learning from Mistakes
Instructional Implications

</td></tr>
</table>

A.2(G) write an equation of a line that is parallel or perpendicular to the x- or y- axis and determine whether the slope of the line is zero or undefined	Analysis of Assessed Standards	

Q12

What is the equation of the line that passes through the point (−2, 7) and has a slope of zero?

F $x = 7$

G $y = -2$

H $x = -2$

J $y = 7$

Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Supporting
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
F			☐ Guessing
G			☐ Careless Error
H			☐ Stopped Too Early
J			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.3(A) determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$

	Analysis of Assessed Standards

Q13

What is the slope of the line that passes through the points $(5, -11)$ and $(-9, 17)$?

A -2

B $-\dfrac{1}{2}$

C 7

D 2

Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Supporting
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.3(A) determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$

	Analysis of Assessed Standards

Q14

What is the slope of the line represented by $5x - 12y = 24$?

F -2

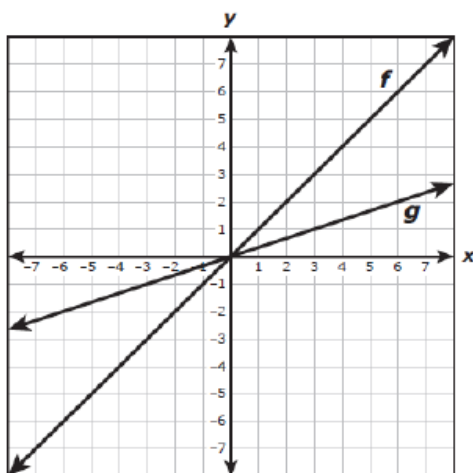G $\dfrac{24}{5}$

H -12

J $\dfrac{5}{12}$

Cluster	Linear Functions
Subcluster	Writing Linear Equations
Content	Supporting
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
F			☐ Guessing
G			☐ Careless Error
H			☐ Stopped Too Early
J			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.3(E) determine the effects on the graph of the parent function f(x) = x when f(x) is replaced by af(x), f(x) + d, f(x - c), f(bx) for specific values of a, b, c, and d

!

Q**15**

The graphs of linear functions *f* and *g* are shown on the grid.

Which function is best represented by the graph of *g*?

A $g(x) = f(x) - 4$

B $g(x) = \frac{1}{3}f(x)$

C $g(x) = f(x) - 2$

D $g(x) = 3f(x)$

Analysis of Assessed Standards	
Cluster	Linear Functions
Subcluster	Describing Linear Functions
Content	Supporting
Process	
Stimulus	

Data Analysis		

Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.3(E) determine the effects on the graph of the parent function f(x) = x when f(x) is replaced by af(x), f(x) + d, f(x - c), f(bx) for specific values of a, b, c, and d

	Analysis of Assessed Standards	
Cluster	Linear Functions	
Subcluster	Describing Linear Functions	
Content	Supporting	
Process		
Stimulus		

Q16

A student graphed $f(x) = x$ and $g(x) = f(x) + 3$ on the same coordinate grid. Which statement describes how the graphs of f and g are related?

A   The graph of f is shifted 3 units up to create the graph of g.

B   The graph of f is steeper than the graph of g.

C   The graph of f is shifted 3 units down to create the graph of g.

D   The graph of f is less steep than the graph of g.

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.5(A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides	Analysis of Assessed Standards	

Q17

What value of n makes the equation $4(0.5n - 3) = n - 0.25(12 - 8n)$ true?

F 3

G −9

H 0

J −15

Cluster	Linear Functions
Subcluster	Solving Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
F			☐ Guessing
G			☐ Careless Error
H			☐ Stopped Too Early
J			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.5(A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides	Analysis of Assessed Standards	

Q18

What is the solution to $34x + 95 = 3(14x + 9)$?

Record your answer and fill in the bubbles on your answer document.

Cluster	Linear Functions
Subcluster	Solving Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
			☐ Guessing
			☐ Careless Error
			☐ Stopped Too Early
			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.5(A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides

(!)

Q19

What is the solution to $8x - 3(2x - 4) = 3(x - 6)$?

A 6

B 2

C 30

D No solution

Cluster	Linear Functions
Subcluster	Solving Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.5(A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides

Q20

Which value of x makes the equation $0.75(x + 20) = 2 + 0.5(x - 2)$ true?

F 64

G −64

H 56

J −56

Cluster	Linear Functions
Subcluster	Solving Linear Equations
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
F			☐ Guessing
G			☐ Careless Error
H			☐ Stopped Too Early
J			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

Systems of Equations and Inequalities

A.2 Linear functions, equations, and inequalities. The student applies the mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations.
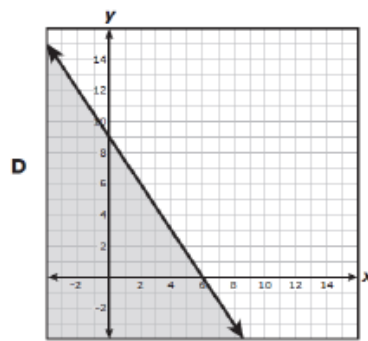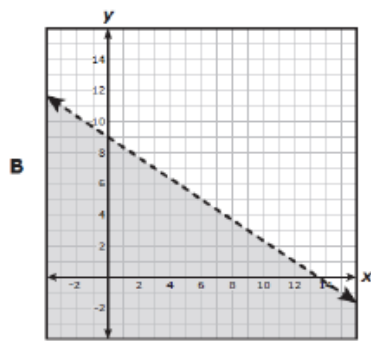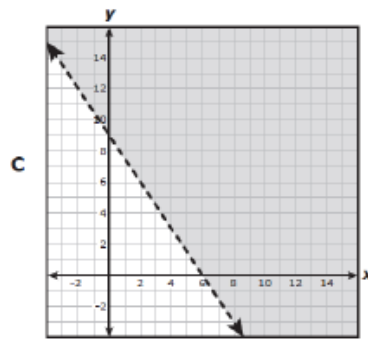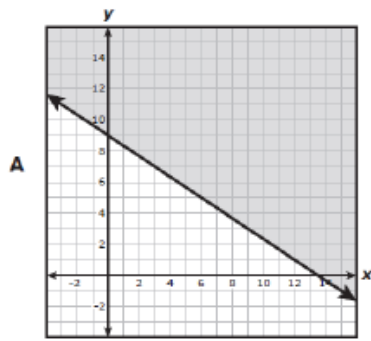
A.3 Linear functions, equations, and inequalities. The student applies the mathematical process standards when using graphs of linear functions, key features, and related transformations to represent in multiple ways and solve, with and without technology, equations, inequalities, and systems of equations.

A.5 Linear functions, equations, and inequalities. The student applies the mathematical process standards to solve, with and without technology, linear equations and evaluate the reasonableness of their solutions.

A.3(D) graph the solution set of linear inequalities in two variables on the coordinate plane

Q21

Which graph best represents the solution set of $-4x \le 6y - 54$?

Analysis of Assessed Standards	
Cluster	Systems of Equations and Inequalities
Subcluster	Inequalities
Content	Readiness
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.3(D) graph the solution set of linear inequalities in two variables on the coordinate plane	Analysis of Assessed Standards	

A.3(D) graph the solution set of linear inequalities in two variables on the coordinate plane

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Q22

The graph of $2x - 5y = 10$ is shown on the grid.
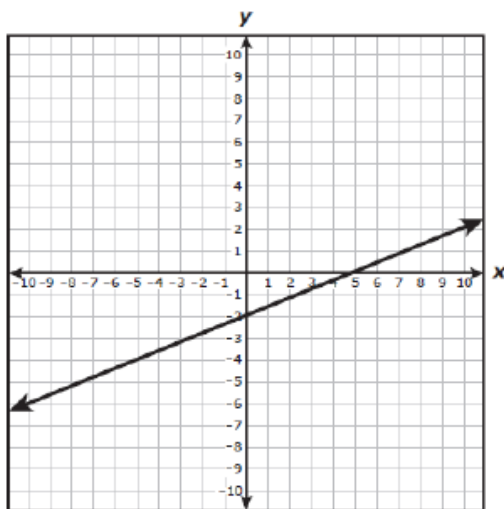
Which ordered pair is in the solution set of $2x - 5y \geq 10$?

A $(0, 5)$

B $(5, 0)$

C $(-2, 5)$

D $(-5, 2)$

Cluster	Systems of Equations and Inequalities
Subcluster	Inequalities
Content	Readiness
Process	
Stimulus	

Data Analysis		

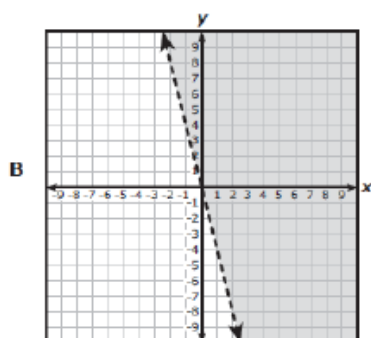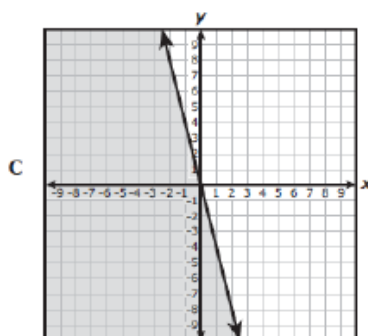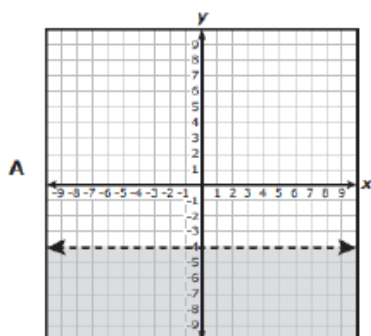| Item			Error Analysis
			☐ Guessing
A			☐ Careless Error
			☐ Stopped Too Early
B			☐ Mixed Up Concepts
C			
D			

Learning from Mistakes
Instructional Implications

A.3(D) graph the solution set of linear inequalities in two variables on the coordinate plane	Analysis of Assessed Standards	

Q23

Which graph best represents the solution set of $y \leq -4x$?

A

C

B

D

Analysis of Assessed Standards	
Cluster	Systems of Equations and Inequalities
Subcluster	Inequalities
Content	Readiness
Process	
Stimulus	

Data Analysis		
Item		
A		
B		
C		
D		

Error Analysis
☐ Guessing
☐ Careless Error
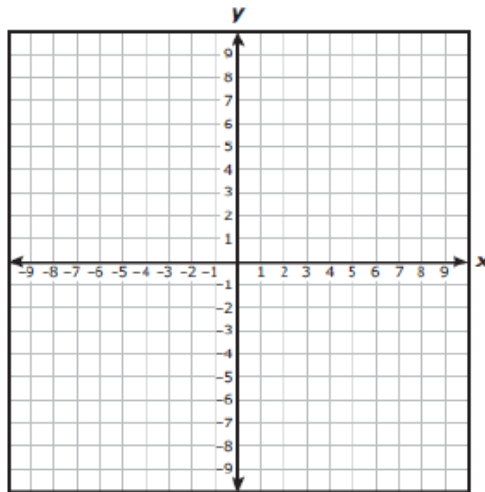☐ Stopped Too Early
☐ Mixed Up Concepts

Learning from Mistakes
Instructional Implications

A.3(D) graph the solution set of linear inequalities in two variables on the coordinate plane

Cluster	Systems of Equations and Inequalities
Subcluster	Inequalities
Content	Readiness
Process	
Stimulus	

Q24

Which ordered pair is in the solution set of $y \geq \frac{1}{3}x + 4$?

A (−6, 1)

B (−1, 6)

C (6, −1)

D (1, −6)

Data Analysis

Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
C			☐ Stopped Too Early
D			☐ Mixed Up Concepts

Learning from Mistakes
Instructional Implications

A.5(B) solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides	Analysis of Assessed Standards	

Q25

What is the solution set for $-4x + 10 \geq 5x + 55$?

F $x \geq 5$

G $x \geq 45$

H $x \leq -5$

J $x \leq -45$

Cluster	Systems of Equations and Inequalities
Subcluster	Inequalities
Content	Supporting
Process	
Stimulus	

Data Analysis			
Item			Error Analysis
F			☐ Guessing
G			☐ Careless Error
H			☐ Stopped Too Early
J			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

Quadratic Functions

A.6 Quadratic functions and equations. The student applies the mathematical process standards when using properties of quadratic functions to write and represent in multiple ways, with and without technology, quadratic equations.

A.7 Quadratic functions and equations. The student applies the mathematical process standards when using graphs of quadratic functions and their related transformations to represent in multiple ways and determine, with and without technology, the solutions to equations.

A.8 Quadratic functions and equations. The student applies the mathematical process standards to solve, with and without technology, quadratic equations and evaluate the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data.

Connected Knowledge and Skills A.12

A.6(A) determine the domain and range of quadratic functions and represent the domain and range using inequalities

2018 – Q26

What is the range of $y = -x^2 - 2x + 3$?

A $x \leq 4$

B $x \geq -4$

C $y \leq 4$

D $y \geq -4$

Analysis of Assessed Standards

Cluster	Quadratic Functions
Subcluster	Describing Quadratic Functions
Content	Readiness
Process	
Stimulus	

Data Analysis

Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
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D			☐ Mixed Up Concepts

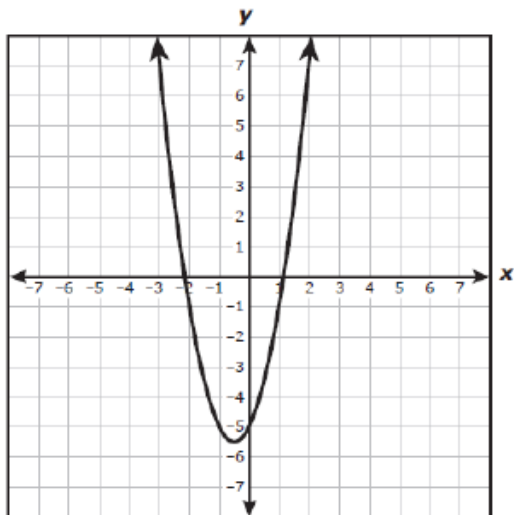### Learning from Mistakes
Instructional Implications

A.6(A) determine the domain and range of quadratic functions and represent the domain and range using inequalities	Analysis of Assessed Standards	
	Cluster	Quadratic Functions
	Subcluster	Describing Quadratic Functions
	Content	Readiness
	Process	
	Stimulus	

The graph of quadratic function *f* is shown on the grid.

Which of these best represents the domain of *f* ?

F $-3 \leq x \leq 2$

G All real numbers

H $y \geq 5.5$

J All real numbers less than -3 or greater than 2

Data Analysis			
Item			Error Analysis
F			☐ Guessing
			☐ Careless Error
G*			☐ Stopped Too Early
H			☐ Mixed Up Concepts
J			

Learning from Mistakes Instructional Implications

A.6(A) determine the domain and range of quadratic functions and represent the domain and range using inequalities	Analysis of Assessed Standards	

Q28

What is the domain of $f(x) = 9 - x^2$?

F $f(x) \geq 9$

G All real numbers

H $-3 \leq x \leq 3$

J $x \leq 9$

Cluster	Quadratic Functions
Subcluster	Describing Quadratic Functions
Content	Readiness
Process	
Stimulus	

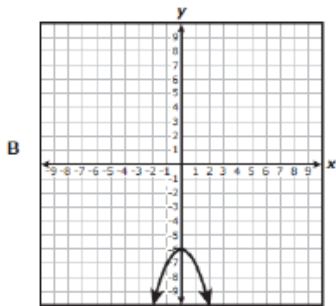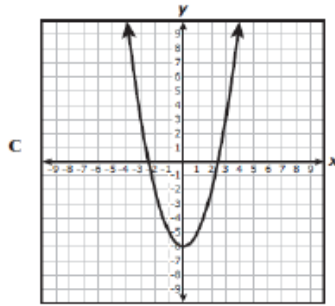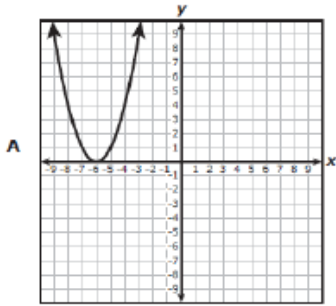| Data Analysis			
Item			Error Analysis
F			☐ Guessing
G			☐ Careless Error
H			☐ Stopped Too Early
J			☐ Mixed Up Concepts

Learning from Mistakes Instructional Implications

A.6(A) determine the domain and range of quadratic functions and represent the domain and range using inequalities	Analysis of Assessed Standards	
	Cluster	Quadratic Functions
	Subcluster	Describing Quadratic Functions
	Content	Readiness
	Process	
	Stimulus	

Q29

Which graph best represents a function with a range of all real numbers greater than or equal to −6?

Data Analysis			
Item			Error Analysis
A			☐ Guessing
B			☐ Careless Error
			☐ Stopped Too Early
C			☐ Mixed Up Concepts
D			

Learning from Mistakes Instructional Implications