NM Public Education Department

MATHEMATICS: ALGEBRA I

END-OF-COURSE EXAM | GRADE 7–12 | YEAR 18–19

ASSESSMENT BLUEPRINT

Purpose Statement
Mathematics: Algebra I

The Algebra I End-of-Course (Eoc) exam is designed to measure student proficiency of the Common Core State Standards (CCSS) in Mathematics pertaining to Algebra I. This course-level exam is provided to all students who have completed Algebra I, Algebra I Eighth Grade, or related courses.

A Note about Assessed Grades:
The Algebra I EoC is based on the Common Core State Standards for Algebra I and was written for high school level courses. However, the exam may be administered to students in grades 7 – 12 as long as they have completed a course in Algebra I with a curriculum based on the CCSS indicated on this blueprint.

EOC Assessment Aligns to the Following Course Codes:
- 2028-Algebra I Eighth Grade
- 2031-Algebra I

Intended as a final exam for the course, this is a summative exam covering a wide range of content, skills, and applications. Scores are reported to the teacher, school, district, and state levels for the purpose of student grades, curriculum review, student graduation requirements, and the optional use for the Educator Effectiveness System.

Resources Required for Testing:
- Graphing calculator allowed for all items with the same restrictions as PARCC
- PARCC math reference sheet, attached

"The EOCs are exams written by New Mexico Teachers for New Mexico Students."
During the 2016-17 school year, teachers were brought together in person and online to revise the blueprints. The NMPED extends our gratitude to those who contributed to this improvement process. Although we were unable to implement *every* suggestion due to conflicting viewpoints at times, this blueprint reflects the best collaborative effort among dedicated peers.

NMPED wants to especially recognize the following person(s) who led the revision for this blueprint:

Ronda Davis, Albuquerque Public Schools, Blueprint Lead
Shafiq Chaudhary, New Mexico Public Education Department

Test Specifications Guide

CCSS Standard Identifier	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
A.APR.A.1 **This coding follows the same identifier in the CCSS**	*Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.* **CCSS Mathematics Standards are located at: http://www.corestandards.org**	A-APR.1-1: Add, subtract, and multiply polynomials. **The PARCC Evidence Statement Key uses the same coding as the PARCC Evidence Statements which are located at:** https://prc.parcconline.org/library/grades-3-11-mathematics-evidence-statementsinformational-guides **PARCC does not have evidence statements provided for all standards.**	*Major* **PARCC Claims are identified as Major, Supporting, and Additional**
	Item Types: **Identifies the format of the response for the item. Response modes on the Algebra I EOC may include:** **MC Multiple Choice** **MS Multiple Select** **EE Equation Editor** **HS Hot Spot**		
	Stimulus: **Conveys that the question may include a graph, chart, number line, etc., when measuring the specific standard**		
	Assessment Limits & Clarifications: **Provides additional supporting information** ****NOTE: "Tasks do not have a context" means that those tasks will be straightforward and will not include application problems.**		

Algebra I EoC Test Specifications

Based on CCSS High School: Algebra

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
A.APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	A-APR.1-1: Add, subtract, and multiply polynomials.	Major
	Item Types: MC, EE		
	Stimulus: Geometric Shape – may or may not have		
	Assessment Limits & Clarifications: • Tasks may have a context.		
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.	None	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks may have a context.		
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.	None	Major
	Item Types: HS & MC		
	Stimulus: None		
	Assessment Limits & Clarifications:		

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	• Tasks may have a context.		
A.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	A-CED.4-1: Rearrange linear formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context. • The quantity of interest is linear in nature.		
A.SSE.A.1	Interpret expressions that represent a quantity in terms of its context. A. Interpret parts of an expression, such as terms, factors, and coefficients. B. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.*	A-SSE.1-2: Interpret quadratic expressions that represent a quantity in terms of its context. Interpret parts of an expression, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context.		
A.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a*	A-SSE.2-1: Use the structure of numerical expressions and polynomial expressions in one variable to identify ways to rewrite it.	Major

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.		
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context.		
A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	A-REI.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks may have a context. • Tasks do not include absolute value equations or compound inequalities.		
A.REI.B.4.B	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	A-REI.4b-1: Solve quadratic equations in one variable. Solve quadratic equations with rational number coefficients by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation.	Major
	Item Types: MC, EE		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context. • For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required. • Methods are not explicitly assessed. • The word quadratic will not be used in the stem.		

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
A.REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	A-REI.6-1: Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Additional
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context.		
A.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	A-REI.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context.		
A.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	A-REI.11-1: Find the solutions of where the graphs of the equations *y= f(x)* and *y= g(x)* intersect, e.g. using technology to graph the functions, make tables of values or find successive approximations. Limit *f(x)* and/or *g(x)* to linear and quadratic functions.	Major
	Item Types: MC, MS		
	Stimulus: None		

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	Assessment Limits & Clarifications: • Tasks do not have a context.		
A.REI.D.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	A-REI.12: Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	Major
	Item Types: HS, MC		
	Stimulus: Graph		
	Assessment Limits & Clarifications: • Tasks do not have a context.		
F.BF.B.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	F-BF.3-1 : Identify the effect on the graph of replacing *f(x)* by *f(x) + k, k f(x)*, *f(kx)*, and *f(x + k)* for specific values of *k* (both positive and negative); find the value of *k* given the graphs limiting the function types to linear and quadratic functions.	Additional
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context. • Tasks may involve more than one transformation.		
F.IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of	F-IF.1: Understand that a function from one set (called the domain) to another set (called the	Major

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).	range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x)*.	
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context.		
F.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	F-IF.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks may have a context.		
F.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.	F-IF.4-1: For a linear or quadratic function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums end behavior;*	Major

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
		and symmetries.	
	Item Types: MC		
	Stimulus: May include Graphs and/or Tables		
	Assessment Limits & Clarifications: • Tasks may have a context.		
F.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.	F-IF.5-1 : Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context.		
F.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	F-IF.6-1a: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.	Major
	Item Types: MC		
	Stimulus: Table		
	Assessment Limits & Clarifications: • Tasks have a context.		

CCSS STANDARD	CONTENT STANDARD	PARCC EVIDENCE STATEMENT KEY	PARCC CLAIM CATEGORY
	• Tasks must include the interpret part of the evidence statement.		
S.ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	S-ID.Int.1: Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.	Major
	ITEM TYPES: MC		
	STIMULUS: Graph		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks have a context. • Line of best fit is always based on the equation of the least squares regression line either provided or calculated through the use of technology.		
S.ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.	S-ID.Int.1: Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.	Major
	ITEM TYPES: MC		
	STIMULUS: Graph		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks do not have a context.		

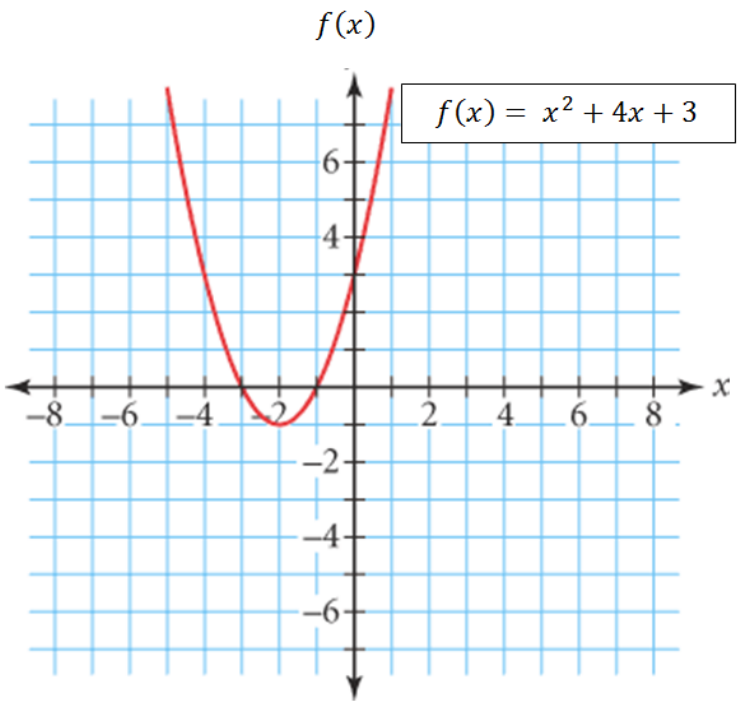
CCSS STANDARD	CONTENT STANDARD	PARCC EVIDENCE STATEMENT KEY	PARCC CLAIM CATEGORY
	• Line of best fit is always based on the equation of the least squares regression line either provided or calculated through the use of technology.		
S.ID.C.9	Distinguish between correlation and causation.	S-ID.Int.1: Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.	Major
	ITEM TYPES: MC		
	STIMULUS: May include a Graph		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks have a context. • Line of best fit is always based on the equation of the least squares regression line either provided or calculated through the use of technology.		

Algebra I EoC Standards Alignment Framework					
Common Core Standard	**DOK (Item number by DOK)**			**Grand Total**	**CCSS Focus Cluster**
	1	**2**	**3**		
A.APR.A.1	1	1		2	Major
A.CED.A.1	1	1		2	Major
A.CED.A.2	1			1	Major
A.CED.A.4	1			1	Major
A.SSE.A.1	1			1	Major
A.SSE.A.2	1			1	Major
A.REI.B.3	2			2	Major
A.REI.B.4.B		1	1	2	Major
A.REI.C.6		1		1	Additional
A.REI.D.10	1	1		2	Major
A.REI.D.11	1			1	Major
A.REI.D.12		1		1	Major
F.BF.B.3	1			1	Additional
F.IF.A.1	1			1	Major
F.IF.A.2		1		1	Major
F.IF.B.4	2	2		4	Major
F.IF.B.5		1		1	Major
F.IF.B.6		1		1	Major
S.ID.C.7		1		1	Major
S.ID.C.8	1			1	Major
S.ID.C.9	1			1	Major
Grand Total	**16**	**12**	**1**	**29**	**94% Major**

Sample Questions

Multiple Select Sample Item (CCSS: F.IF.B.4) DOK 2

1.

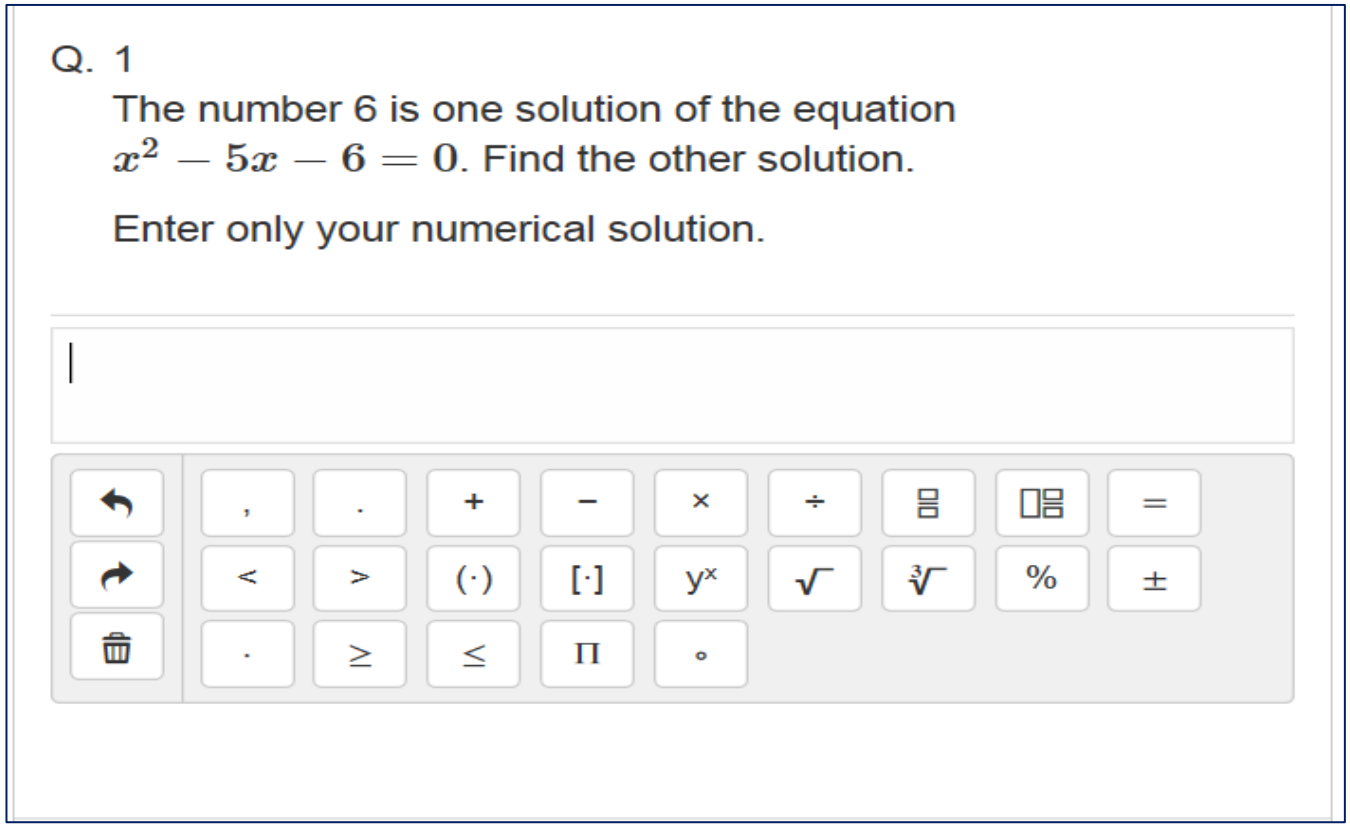


Given the graph of the function, which of these statements are correct?
Select all that apply.

a. (-1, 0) is an x-intercept.*
b. (-3, 0) is an x-intercept.*
c. (0, 3) is a y-intercept.*
d. (-2, 0) is the minimum.
e. x= -2 is a line of symmetry. *
f. The function is increasing on the interval (-2,∞)*

g. The function is positive on the interval (-2, ∞)

2. Equation Editor (A.REI.B.4.B) DOK 1
*Correct answer is: ***x*= –1**

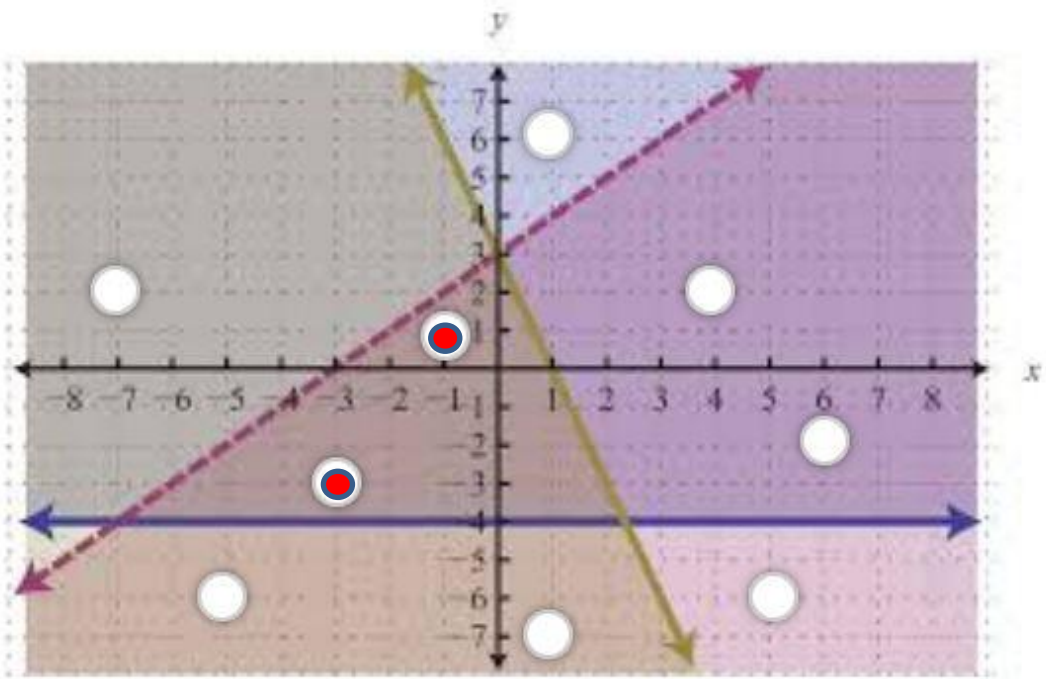


3. Hot Spot (CCSS: A-REI.D.12) DOK 2

Question 1

The graph shows the solution set to $\begin{cases} 3x + y \leq 3 \\ y - x < 3 \\ y + 4 \geq 0 \end{cases}$

Select all the points that are solutions to this system.



Correct answers are marked in red.*

4. Describe the transformation between the graphs of:

   $f(x) = 2x + 3$, to the graph of $g(x) = -2x + 3$

   A. The graph of *f(x)* shifts 2 units down.

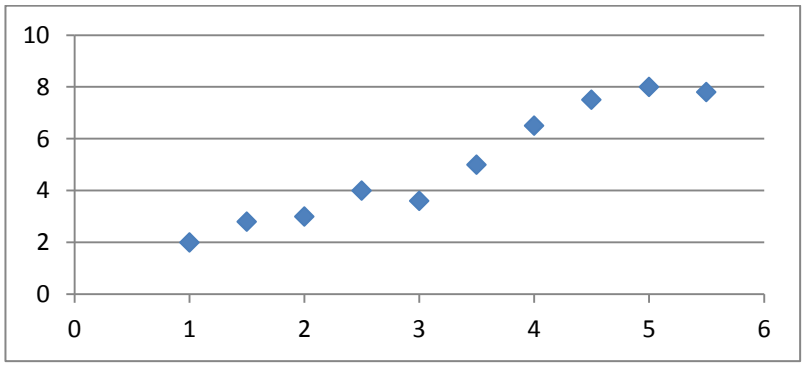
   B. The graph of *f(x)* shifts 2 units up.

   C. The graph of *f(x)* reflects over the *x*-axis.

   D. The graph of *f(x)* reflects over the *y*-axis. *

   F.BF.3 DOK 2
   Released PED item

5. Find the appropriate linear regression model and correlation coefficient for the data graphed below.



   A. y = -2.5 +4; r = -1

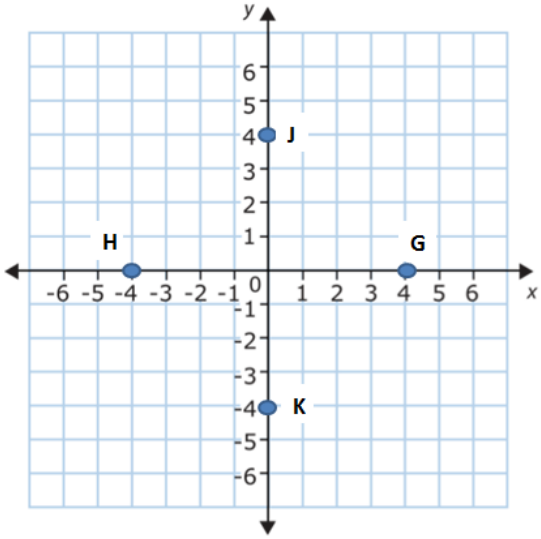
   B. y = -1.5*x* -3; r= -0.8

   C. y = 2.5*x* -4; r = .2

   D. y = 1.5*x* +0.3; r = .9 *

S.ID.8 DOK 2
Released PED item

The graph of y = f(x) is shown below.



6. Which point could be used to find f(4)?

A. Point G *

B. Point H

C. Point J

D. Point K

F.IF.1 DOK 1
Released PED item

High School Assessment Reference Sheet

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilograms
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallons
1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n-1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	$1 \text{ radian} = \frac{180}{\pi}$ degrees
Degrees	$1 \text{ degree} = \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t-t_0)} + B_0$