NM Public Education Department

MATHEMATICS: ALGEBRA II

END-OF-COURSE EXAM | GRADE 9–12 | YEAR 17–18

ASSESSMENT BLUEPRINT

Purpose Statement

Algebra II EoC

The Algebra II End-of-Course (EoC) exam is designed to measure student proficiency of the Common Core State Standards pertaining to Algebra II. This course-level assessment is provided to all students who have completed Algebra II or related courses.

EOC Assessment Aligns to the Following Course Codes:

- 2041 – Algebra II

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 purposes 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 would like 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 II EOC may include:** **MC Multiple Choice** **MS Multiple Select** **EE Equation Editor** **HS Hot Spot**		
	Stimulus: **Conveys that the question includes a graph, chart, number line, etc., is used 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 II EoC Test Specifications

Based on CCSS High School: Algebra II

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
N.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	N-RN.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not 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 difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.	A-SSE.2-3: Use the structure of polynomial, rational or exponential expressions 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 difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context. • Tasks will not include sums & differences of cubes.		
A.SSE.B.3.C	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. C. Use the properties of exponents to transform	A-SSE.3c-2: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression, where exponentials are limited to rational or real exponents.	Major

CCSS STANDARD	CONTENT STANDARD	PARCC EVIDENCE STATEMENT KEY	PARCC CLAIM CATEGORY
	expressions for exponential functions. *For example the expression* 1.15t *can be rewritten as* (1.151/12)12*t* ≈ 1.01212t *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	c. Use the properties of exponents to transform expressions for exponential functions. *For example, the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*★	
	ITEM TYPES: MC		
	STIMULUS: None		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks may have a context.		
A.SSE.B.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*	A-SSE.4-2: Use the formula for the sum of a finite geometric series to solve multi- step contextual problems	Major
	ITEM TYPES: MC		
	STIMULUS: None		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks have a context.		
A.APR.B.2	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	A-APR.2: Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	Major
	ITEM TYPES: MS		
	STIMULUS: None		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks do not have a context.		

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
A.APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	No PARCC Evidence Statement	Major
	Item Types: MS & MC		
	Stimulus: May include a graph		
	Assessment Limits & Clarifications: • Tasks do not have a context.		
A.REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	A-REI.2: Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks do not have a context. • Simple rational equations are limited to numerators and denominators that have degree at most 2.		
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.11-2: 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. Include cases where f(x) and/or g(x) are linear, quadratic, polynomial, rational, absolute value, exponential, and/or logarithmic functions. ★	Major
	Item Types: HS & MC		
	Stimulus: None		
	Assessment Limits & Clarifications:		

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	• Tasks do not 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.4-2: For an exponential, polynomial, trigonometric, or logarithmic 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; symmetries; and periodicity.*	Major
	Item Types: MC & MS		
	Stimulus: May include graph		
	Assessment Limits & Clarifications: • Tasks may have a context.		
F.BF.A.1.A	Write a function that describes a relationship between two quantities. A. Determine an explicit expression, a recursive process, or steps for calculation from a context.	No PARCC Evidence Statement	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context.		
S.IC.B.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain	S-IC.3-1: Recognize the purposes of and differences among sample surveys, experiments, and observational studies.	Major

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	how randomization relates to each.		
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context.		
S.IC.B.4	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	S-IC.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-IC.	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks have a context.		
S.IC.B.6	Evaluate reports based on data.	S-IC.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-IC.	Major
	Item Types: MC		
	Stimulus: May include a chart		
	Assessment Limits & Clarifications: • Tasks have a context.		

Algebra II EoC Standards Alignment Framework					
Standard	**DOK (Item # by DOK)**			**Grand Total**	**CCSS Focus Cluster**
	1	**2**	**3**		
N.RN.A.2		1		1	Major
A.SSE.A.2		2		2	Major
A.SSE.B.3.C		1		1	Major
A.SSE.B.4		1		1	Major
A.APR.B.2	1	2		3	Major
A.APR.B.3	1	1	1	3	Major
A.REI.A.2	1	2		3	Major
A.REI.D.11		3		3	Major
F.IF.B.4	1	2		3	Major
F.BF.A.1.A		1		1	Major
S.IC.B.3	1			1	Major
S.IC.B.4		1		1	Major
S.IC.B.6	1			1	Major
Grand Total	**6**	**17**	**1**	**24**	**100% Major**

Sample Questions

1. Given $f(x) = x^3 - 5x^2 + 7x$ and $g(x) = 2^x$. How many real solutions are there for $f(x) = g(x)$?

   A. 0

   B. 3 *

   C. 2

   D. 1

   A.REI.11 DOK 2
   Released PED item

2. Which of the following techniques would yield a simple, random sample?

   A. Divide 25 students into 5 groups. Select the sample by choosing groups one, two, and five.

   B. Put all student ID numbers on individual pieces of paper and have a student draw 20. *

   C. Stand in the school cafeteria and select every 5th student that passes by you.

   D. Divide 25 students into 5 groups. Ask for volunteers from each group to be part of the sample.

   S.IC.3 DOK 1
   Released PED item

3. Chris owes his brother $250. He has agreed to pay back 12% of the remaining balance each month. After making five payments, approximately how much money does Chris still owe?

A. $100

B. $130 *

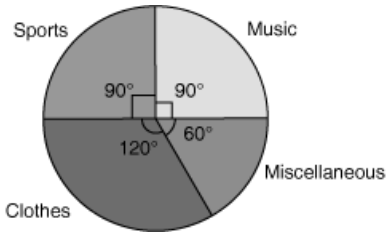
C. $150

D. $220

A.SSE.4 DOK 3
Released PED item

A student spends $144 each month. He made a chart of his monthly expenditures on clothes, music, games, and other miscellaneous expenses.

Expenditures



4. How much money does the student spend on miscellaneous expenses?

A. $86

B. $36

C. $24 *

D. $48

S.IC.6 DOK 3
Released PED item

5. Simplify and rewrite the expression $\sqrt{x}\left(\sqrt[4]{x}\right)$ in exponential form.

A. $x^{1/6}$

B. $x^{3/4}$ *

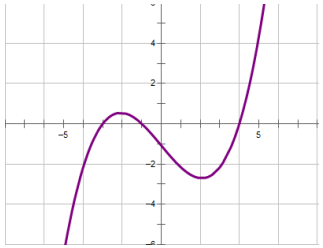
C. $x^{3/2}$

D. $x^{1/8}$

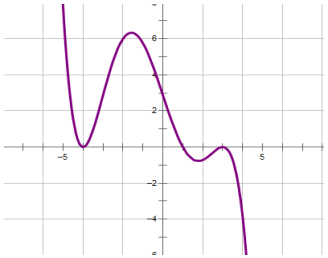
N.RN.2 DOK 2
Released PED item

6. Select that graph that shares the same zeros ***and*** the same end behavior as the function: $f(x)=-(x+3)(x+1)(x-4)$?

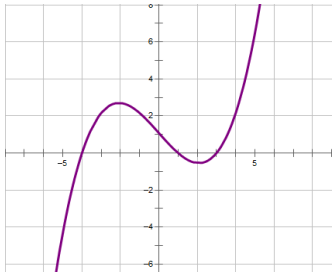
A.



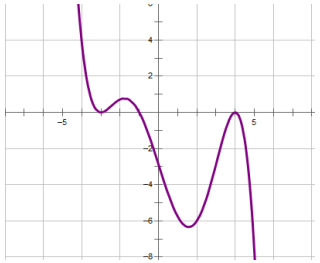
B.



C.



D.*



A.APR.3 DOK
Released PED item

PARCC

Partnership for Assessment of Readiness for College and Careers

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 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t-t_0)} + B_0$