NM Public Education Department

MATHEMATICS: INTEGRATED MATH II

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

ASSESSMENT BLUEPRINT

Purpose Statement

Mathematics: Integrated Math II EoC

The Integrated Math II ADC End-of-Course (EOC) exam is designed to measure student proficiency in a subset of the Common Core State Standards for Mathematics. Covering the essential math content, skills, and applications identified as necessary for college and career readiness, this exam is intended as an Alternate Demonstration of Competency (ADC) for students to meet graduation requirements. As with all ADCs, students must attempt all available administrations of the High School Graduation Assessment (HSGA) before implementing a passing score on the Math ADC. In some instances, the Mathematics ADC may align with course curricula and be used in the Educator Effectiveness System.

EOC Assessment Aligns to the Following Course Codes:

- 2081 – Integrated Math 2 Grades 9-11

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 a question may include a graph, chart, number line, etc., when measuring the specific standard**		
	Assessment Limits & Clarifications: **Provides additional supporting information**		

Integrated Math II EoC Test Specifications

Based on the CCSS Mathematics

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
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 have a context.		
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 have graphic		
	Assessment Limits & Clarifications: • Tasks do not have a context.		
A.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	None	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks may have a context.		
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	A-REI.4b-1: Solve quadratic equations in one variable. Solve quadratic	Major

CCSS STANDARD	CONTENT STANDARD	PARCC EVIDENCE STATEMENT KEY	PARCC CLAIM CATEGORY
	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.	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.	
	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.		
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.	None	Major
	ITEM TYPES: MC		
	STIMULUS: None		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks have a context.		
A.SSE.A.1	Interpret expressions that represent a quantity in terms of its context.	A-SSE.1-2: Interpret quadratic expressions that represent a quantity	Major

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	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*.	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.	
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications: • Tasks 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*.	None	Major
	Item Types: MC		
	Stimulus: Graphs, 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.*	None	Major
	Item Types: MC		
	Stimulus: None		
	Assessment Limits & Clarifications:		

CCSS STANDARD	CONTENT STANDARD	PARCC EVIDENCE STATEMENT KEY	PARCC CLAIM CATEGORY
	• 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.	None	Major
	ITEM TYPES: MC		
	STIMULUS: Table		
	ASSESSMENT LIMITS & CLARIFICATIONS: • Tasks have a context. • Tasks must include the interpret part of the evidence statement.		
G.SRT.A.1.B	Verify experimentally the properties of dilations given by a center and a scale factor.	G-SRT.1a: Verify experimentally the properties of dilations given by a center and a scale factor. a) A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	Major
	ITEM TYPES: MC		
	STIMULUS: Geometric Shape		
	ASSESSMENT LIMITS & CLARIFICATIONS: • None		
G.SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	G-SRT.2: Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar.	Major
	ITEM TYPES: MC		
	STIMULUS: Geometric Shape		

CCSS Standard	Content Standard	PARCC Evidence Statement Key	PARCC Claim Category
	Assessment Limits & Clarifications: • The "explain" part of standard G-SRT.2 is not assessed here.		
G.SRT.B.4	Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely, the Pythagorean Theorem proved using triangle similarity.	HS.C.14.6: Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures.	Major
	Item Types: MC		
	Stimulus: Geometric Shape		
	Assessment Limits & Clarifications: • None		
G.SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	G-SRT.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Major
	Item Types: MC		
	Stimulus: Geometric Shape		
	Assessment Limits & Clarifications: • None		
G.SRT.C.6	Understand that, by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	G-SRT.6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	Major
	Item Types: MC		
	Stimulus: Geometric Shape		
	Assessment Limits & Clarifications:		

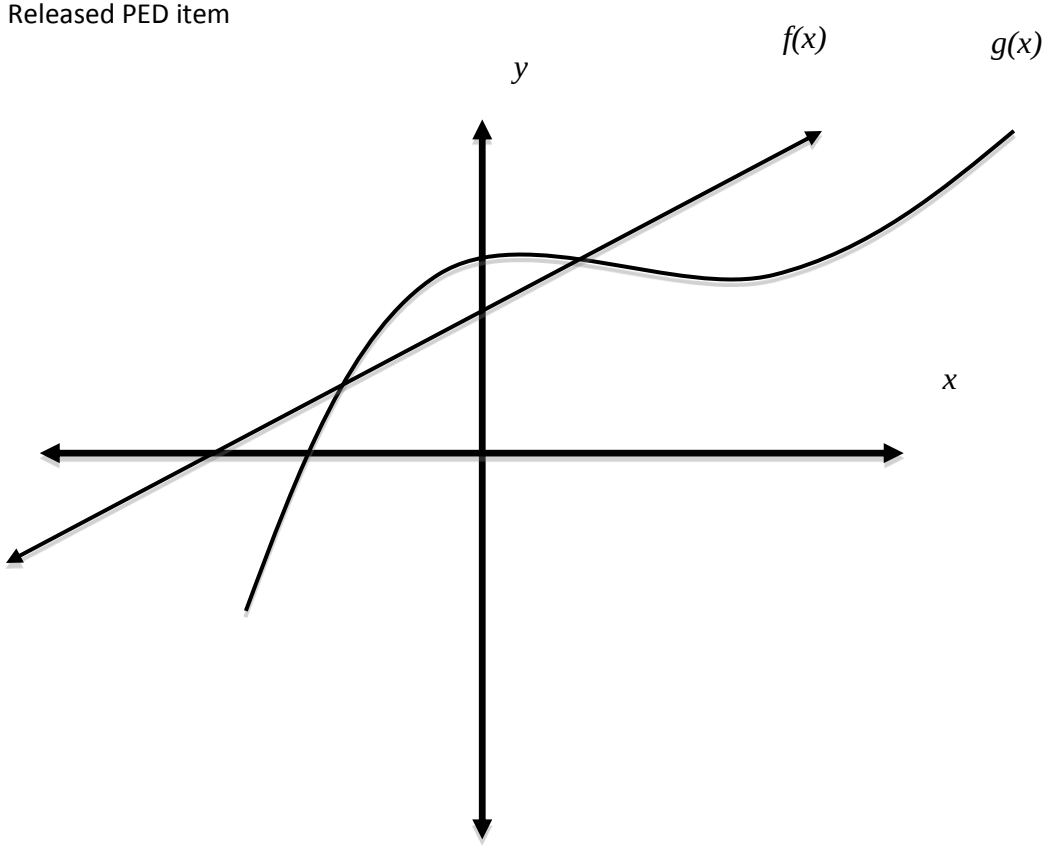
CCSS STANDARD	CONTENT STANDARD	PARCC EVIDENCE STATEMENT KEY	PARCC CLAIM CATEGORY
	• Trigonometric ratios include sine, cosine, and tangent only.		
G.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.	G-SRT.7-2: Use the relationship between the sine and cosine of complementary angles.	Major
	ITEM TYPES: MC		
	STIMULUS: Geometric Shape		
	ASSESSMENT LIMITS & CLARIFICATIONS: • The "explain" part of standard G-SRT.7 is not assessed here.		
G.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	G-SRT.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	Major
	ITEM TYPES: MC		
	STIMULUS: Geometric Shape		
	ASSESSMENT LIMITS & CLARIFICATIONS: • The task may have a real world or mathematical 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; however, students will not be penalized if they simplify the radicals correctly.		

Integrated Math II EoC Standards Alignment Framework					
Common Core Standard	**DOK (Item # by DOK)**			**Grand Total**	**CCSS Cluster Focus**
	1	**2**	**3**		
A.CED.A.1	2	1		3	Major
A.APR.A1	1	1		2	Major
A.REI.A.1	1	1		2	Major
A.REI.B.4.B		1		1	Major
A.REI.D.11		1		1	Major
A.SSE.A.1	1	1		2	Major
F.IF.B.4	2	1		3	Major
F.IF.B.5		1		1	Major
F.IF.B.6		1		1	Major
G.SRT.A.1.B	1			1	Major
G.SRT.A.2		1		1	Major
G.SRT.B.4	1			1	Major
G.SRT.B.5	1	1		2	Major
G.SRT.C.6	1	1		2	Major
G.SRT.C.7		1		1	Major
G.SRT.C.8	1			1	Major
Grand Total	**12**	**13**	**0**	**25**	**100% Major**

Sample Questions

1. Below is a graph of $f(x)$ and $g(x)$ on the same coordinate plane. Which accurately describes the solutions of $f(x) = g(x)$?

A.REI.11 DOK 2
Released PED item



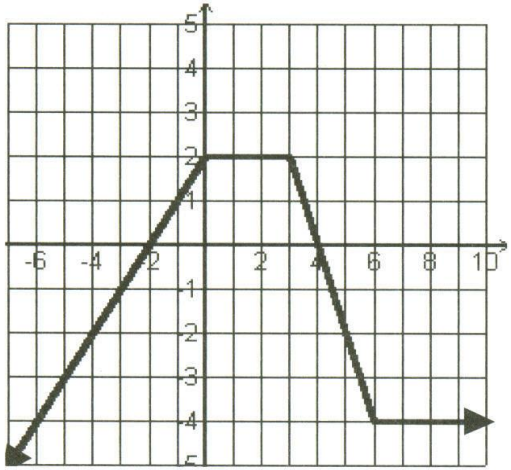
A. The points where $f(x)$ and $g(x)$ intersect the x-axis.

B. The points where $f(x)$ and $g(x)$ intersect the y-axis.

C. There are no solutions for $f(x) = g(x)$.

D. The points where $f(x)$ intersects $g(x)$. *

Directions: Use the graph below to answer questions #2 and #3.



2. Which interval has the ***greatest*** rate of change?

A. $(-\infty, 0)$ *

B. $(0, 3)$

C. $(3, 6)$

D. $(6, \infty)$

F.IF.6 DOK 2
Released PED item

3. What is the domain and range of the function above?

A. $D: x \le 2$
$R: -\infty < y < \infty$

B. $D: -6 \le x \le 8$
$R: -4 < y < 2$

C. $D: -4 < x < 2$
$R: -6 \le y \le 8$

D. $D: -\infty < x < \infty$
$R: y \le 2$ *

F.IF.5 DOK 2
Released PED item

4. A college had 2,800 students in 2000 and 3,250 students in 2002. What is the rate of change in the number of students at this college per year?

A. 225 students per year *

B. 450 students per year

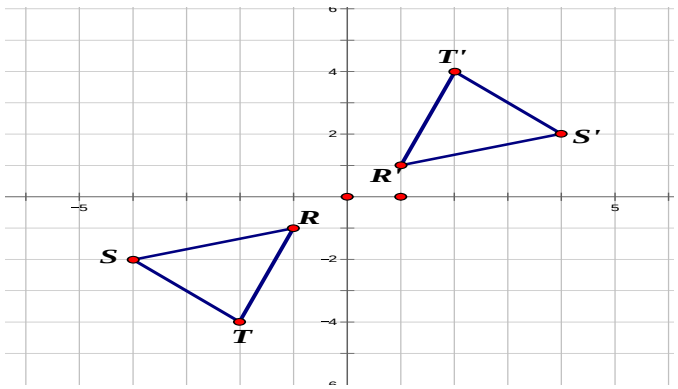
C. 550 students per year

D. 3025 students per year

Year	Number of Students
2000	2,800
2002	3,250

F.IF.6 DOK 2
Released PED item

Triangle RST is reflected across the y-axis, and then its image is reflected across the x-axis.



5. Which single transformation could move the triangle from its starting position to its final position?

A. a rotation of 90° about the origin

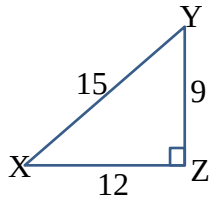
B. a rotation of 180° about the origin *

C. a reflection across the x-axis

D. a reflection across the y-axis

G.GMD.4b DOK 1
Released PED item

Given the figure:



6. Write a trigonometric ratio for cos X.

A. cos X = $\frac{9}{12}$

B. cos X = $\frac{9}{15}$

C. cos X = $\frac{12}{9}$

D. cos X = $\frac{12}{15}$ *

G.SRT.8 DOK 1

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	$A = A_0 e^{k(t-t_0)} + B_0$