A Correlation of

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Integrated CME Project
Mathematics II
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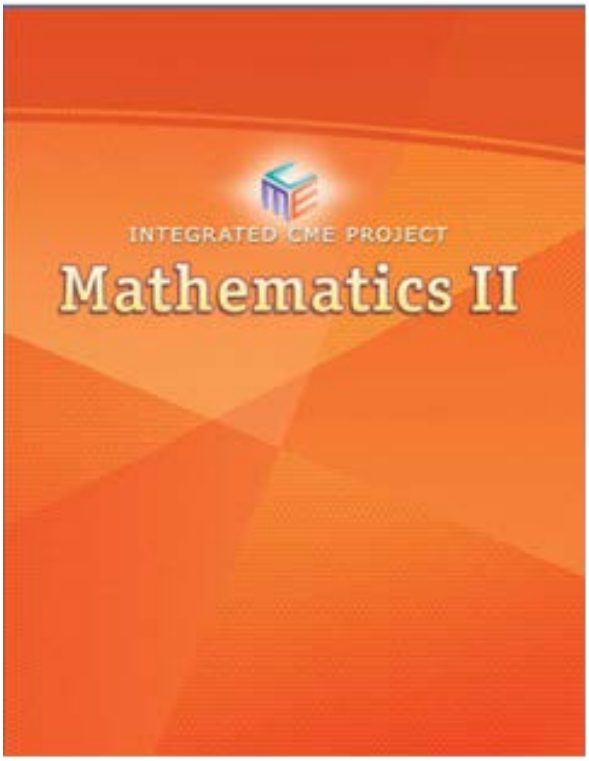

to the

Common Core State Standards for Mathematics - High School
PARRC Model Content Frameworks
Mathematics II

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PARRC Model Content Frameworks Mathematics II

Introduction

This document demonstrates how ***Pearson Integrated CME Project*** **Mathematics II ©2013** meets the standards of the *Common Core State Standards for Mathematics, PAARC Model Content Frameworks, Mathematics II.* Correlation references are to the pages of the Student and Teacher's Editions.

The ***Integrated CME Project*** is an NSF-funded core mathematics program that was built for the Integrated Pathway of the Common Core State Standards. It includes content from algebra, geometry, as well as Precalculus concepts. The program's proven-effective pedagogy provides the focus, coherence, and rigor necessary to ensure today's students master the challenging new Common Core State Standards. The program also incorporates technology and hands-on projects and activities to engage today's digital students in deep mathematical learning.

Integrated CME Content includes Mathematics I, Mathematics II, and Mathematics III. Each course is focused on big ideas. ***Integrated CME Project*** is organized by coherent chapters. Chapters are comprised of investigation. Each Investigation is then composed of 3-6 lessons. The basic mathematics of each Investigation is accessible to all, and each Investigation can ultimately challenge the best students. The students work from a more informal to formal understanding of the mathematical topic explored in that particular chapter. The Investigation wrap-up, called Mathematical Reflections, provides an opportunity to review and summarize at the end of the chapter—good preparation for the Next-Generation assessments that will require students to justify their conclusions and mathematical understandings in writing. A Chapter Project extends student understanding by presenting challenges and highlighting connections to additional topics—projects are great preparation for performance tasks that will be on the upcoming Next-Generation assessments.

This document demonstrates the high degree of success students will achieve by using ***Pearson Integrated CME Project*** **Mathematics II.**

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Number and Quantity	
The Real Number System N-RN	
Extend the properties of exponents to rational exponents.	
1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*	**SE/TE:** 31 (#3), 44 (#4), 45 (#11), 49 (#2-3), 50, 51 (#4), 52 (#8-11), 53 (#13-14, 19), 54-58
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**SE/TE:** 16-20, 50 (Example 1), 53 (#14), 54-56, 57 (#9, 13), 58 (#16), 59 (#2, 5), 60 (#6)
Use properties of rational and irrational numbers.	
3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	**SE/TE:** 24-25, 26 (#6-8), 27 (#11-12, 14-15)
Quantities★ N -Q	
Reason quantitatively and use units to solve problems.	
2. Define appropriate quantities for the purpose of descriptive modeling.	**SE/TE:** 608-612, 613, 623-625, 626-627, 645-649
The Complex Number System N -CN	
Perform arithmetic operations with complex numbers.	
1. Know there is a complex number *i* such that $i^2 = -1$, and every complex number has the form $a + bi$ with *a* and *b* real.	**SE/TE:** 216, 227 (#4, 6)
2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	**SE/TE:** 216-218, 219-221, 222, 227 (#5)
Use complex numbers in polynomial identities and equations.	
7. Solve quadratic equations with real coefficients that have complex solutions.	For related content, please see: **SE/TE:** 213 (#3), 214 (#12), 220 (#7-8), 221 (#15), Honors Appendix: 875, 876 (#1, 4-6)

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Algebra	
Seeing Structure in Expressions A-SSE	
Interpret the structure of expressions	
1. Interpret expressions that represent a quantity in terms of its context.★	**SE/TE:** 65-67, 68-71, 72-73, 74 (#13), 89-91, 99-101, 102-104, 105-109, 117-120, 121 (#1-3, 5), 122-124, 167-169, 170-171, 324-327, 328-331
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.	**SE/TE:** 81, 83 (#2), 84 (#5), 125-129, 130-132, 167-169, 170-171
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 $(x^2 - y^2)(x^2 + y^2)$.	**SE/TE:** 35 (#2), 36, 37-38, 39-41, 42-43, 44-45, 46 (#13-16), 54-57, 65 (#1), 66 (#6), 67 (#13, 15), 68-71, 72-74, 75-78, 79, 80 (#11-12), 113, 116 (311, 14-15), 117-119, 121, 122-124, 125-129, 130-132, 133-138, 139 (#3, 5-7), 140-141, 216-221, 222-226
Write expressions in equivalent forms to solve problems	
3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★	**SE/TE:** 36 (#6-7), 37-38, 39 (#1, 6-7), 40 (#13-14, 16), 41 (#22), 42-44, 45 (#11), 46 (#13-15), 54-56, 58 (#16), 65 (#1), 66 (#6), 67 (#10), 70-71, 75-78, 79 (#3), 80 (#12), 81, 83 (#2), 84-86, 117-120, 121 (#1), 122 (#10), 124 (#25), 125-129, 131 (#7-8), 133-138, 139 (#7)
a. Factor a quadratic expression to reveal the zeros of the function it defines.	**SE/TE:** 75-78, 79 (#2-3, 5, 7), 82, 83 (#3e), 117-118, 123 (#13) 124 (#23), 126-127, 130 (#3), 133, 138 (#1), 139 (#5), 141 (#14, 19), 177-182
b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	**SE/TE:** 133-138, 139 (#5), 141 (#14, 20), 177-182, 185-186, 189, 190
Arithmetic with Polynomials and Rational Expressions A -APR	
Perform arithmetic operations on polynomials	
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.	**SE/TE:** 92-97, 105-109

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Creating Equations★ A -CED	
Create equations that describe numbers or relationships	
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.	**SE/TE:** 98 (#10), 123 (#12), 162-165, 175, 176 (#4), 182 (#8, 10), 189 (#4), 190 (#5-7), 322 (#13), 329 (#7), 331 (#13-15)
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	**SE/TE:** 175, 176 (#4)
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.	For related content, please see: **SE/TE:** 67 (#7), 73 (#9-12), 74 (#13), 79 (#1), 80 (#8), 84 (#7-8)
Reasoning with Equations and Inequalities A -RE I	
Understand solving equations as a process of reasoning and explain the reasoning	
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.	For related content, please see: **SE/TE:** 79 (#1-2), 80 (#8-9), 87 (#3), 123 (#13, 17), 130 (#2-3)
Solve equations and inequalities in one variable	
4. Solve quadratic equations in one variable.	**SE/TE:** 135 (#5), 138 (#1), 139 (#5), 140 (#12), 141 (#14, 19), 142 (#21), 143 (#5), 153-154, 155-161, 162-163, 166 (#5), 203, 221 (#15)
a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.	**SE/TE:** 133-141, 142 (#21-22), 153, 160 (#1-8, 11), 161 (#27)

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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 ± bi for real numbers a and b.	**SE/TE:** 123 (#13), 124 (#23), 130 (#3), 132 (#13), 133-141, 142 (#22), 153, 155-161, 166 (#5), 205-206, 207, 208 (#13-14), 214 (#12), 205 (#13-15), 220 (#11)
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.	For related content, please see: **Integrated CME Project Mathematics I** **SE/TE:** 217 (#5-6), 218 (#9), 321 (#4), 324-325, 328 (#9), 341 (Example 2)
Functions	
Interpreting Functions F-IF	
Interpret functions that arise in applications in terms of the context	
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.★	**SE/TE:** 177, 179-181, 181 (#1-2), 182 (#6-7, 10-12), 184-188, 189-191, 192-197, 197-200, 201, 316-320, 335 (#1-5), 344 (#4, 6), 345, 353 (#6), Honors Appendix: 923, 939 (#6), 940-946, 947-951
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.★	**SE/TE:** 177-181, 182 (#8, 10), 280 (#1-2, 6), 281 (#9, 11-12), 302-303, 347-348, 352 (#1)
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.★	For related content, please see: **SE/TE:** 246-251, 252-258, 342-343

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Analyze functions using different representations	
7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★	For related content, please see: **SE/TE:** 177-182, 183-188, 189 (#2-3), 190 (#9), 191 (#11-12), 192-195, 199 (#8, 10), 335, 336(#16), 337 (#18-22), 338-343, 344 (#4-6), 345, 347-355, 356-364, Honors Appendix: 941-946, 947-951
a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	**SE/TE:** 183-188, 189-191, 337 (#16), 345 (#8), 347-351, 353 (#7), 354 (#12), 356-357, 361 (#1-2, 4), 362 (#9), 364 (#18)
b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	**SE/TE:** 300-304, 306, 307 (#9-10), 308 (#1), 335 (#6-8), 337 (#18)
e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	**SE/TE:** 316-320, 321 (#8), 323 (#22), 335 (#10), 337 (#20), 339
8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	**SE/TE:** 65, 67, 74 (#14), 279, 307 (#6), 308 (#12-13)
a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	**SE/TE:** 133 (#1), 136 (#9), 139 (#5), 141 (#14), 177-181, 182 (#6-12), 183-188, 189 (#1-2, 4), 190 (#5-6, 9), 191 (#12), 193 (#1-3), 197 (#4)
b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.	**SE/TE:** 324-327, 328 (#1), 329 (#7), 331 (#13-15)
9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	**SE/TE:** 177-179, 181 (#1-2), 182 (#11-12), 183-188, 189-191, 192-200, 238-241, 242-243

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Building Functions F-BF	
Build a function that models a relationship between two quantities	
1. Write a function that describes a relationship between two quantities.★	**SE/TE:** 238-239, 241, 242 (#1-3), 244 (#11-12), 246-248, 249-250, 251 (#18), 280 (#7), 281 (#8-9), 282 (#15), 321 (#2-3), 322 (#13), 328 (#1-3, 5), 329 (#7), 330 (#12), 331 (#13-15)
a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	**SE/TE:** 235-237, 238-239, 241, 244 (#11-12), 322 (#13), 329 (#7), 331 (#13-15)
b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	For related content, please see: **SE/TE:** 274-279, 280 (#2), 281 (#11)
Build new functions from existing functions	
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.	**SE/TE:** 335, 337 (#17, 20, 22), 344-345, 347-351, 352 (#1), 353 (#5, 9), 356-364
Geometry	
Similarity, Right Triangles, and Trigonometry G-SRT	
Understand similarity in terms of similarity transformations	
1. Verify experimentally the properties of dilations given by a center and a scale factor:	For related content, please see: **SE/TE:** 561-564, 565-571
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.	Please see: **Integrated CME Project Mathematics I** **SE/TE:** 565-571
b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	For related content, please see: **SE/TE:** 536-543, 565-571

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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.	**SE/TE:** 547, 549-556, 561-562, 565-571, 594, 595-596, 597 (#1), 598-599
3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	**SE/TE:** 600-604, 605-606
Prove theorems involving similarity	
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.	**SE/TE:** 580-581, 583, 584 (#1), 587-590, 716-721
5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	**SE/TE:** 428-430, 431-433, 595-596, 598-599, 600-604, 605-606, 707-709, 710-715, 716-721
Define trigonometric ratios and solve problems involving right triangles	
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.	**SE/TE:** 746-752, Honors Appendix: 907-912
7. Explain and use the relationship between the sine and cosine of complementary angles.	**SE/TE:** 746-752, Honors Appendix: 909-910, 911 (#8-10)
8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★	**SE/TE:** 741-745, 746-752, 753-759, Honors Appendix: 907-912

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Geometric Measurement and Dimension G-GMD	
Explain volume formulas and use them to solve problems	
1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*	**SE/TE:** 629-634, 635-639, 645-646, 763-768, 773-779, 780-784, 785 (#1-6)
3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★	**SE/TE:** 763-768, 773-779, 780-784, 785 (#3, 6), 788-794
Statistics and Probability	
Interpreting Categorical and Quantitative Data S-ID	
Recognize possible associations and trends in the data.	
6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	Please see: **Integrated CME Project Mathematics I** **SE/TE:** 511-514, 515-519, 528-531, 533 (#4)
a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	Please see: **Integrated CME Project Mathematics I** **SE/TE:** 523-524, 525-527, 529-530, 532 (#3), 534 (#8)
b. Informally assess the fit of a function by plotting and analyzing residuals.	This standard is outside the scope of Integrated CME Project.
Conditional Probability and the Rules of Probability S-CP	
Understand independence and conditional probability and use them to interpret data	
1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	**SE/TE:** 379, 381-387
2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	**SE/TE:** 384-385

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3. Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.	**SE/TE:** 388-390, 391 (#8-9), 391 (Theorem 5.2; #13), 392, 394 (#11), 395-400
4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.	**SE/TE:** 393 (#5, 7), 394 (#8-9), 395-400
5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.	**SE/TE:** 389-391, 392-394, 395-400
Use the rules of probability to compute probabilities of compound events in a uniform probability model	
6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A,* and interpret the answer in terms of the model.	**SE/TE:** 388 (#1), 391 (#10-13), 392 (#3, 4), 393 (#7), 394 (#8-10), 395-400
7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.	**SE/TE:** 381-387

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