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enVision™

Integrated Mathematics

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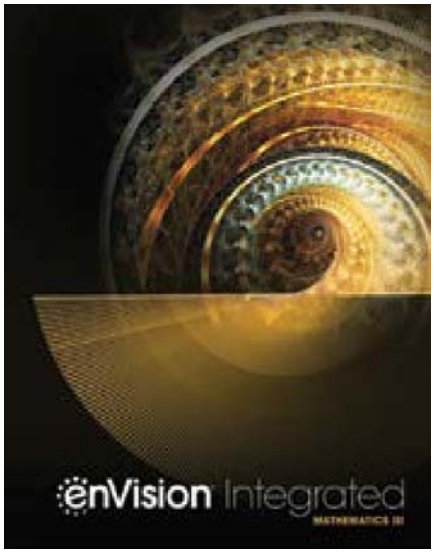

To the

Common Core State Standards for Mathematics High School

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To the Common Core State Standards for Mathematics

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Standards for Mathematical Practice	
MP.1 Make sense of problems and persevere in solving them.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 8, 31, 47, 57, 68, 72, 76, 88, 111, 152 **TE:** 24A-24B, 32, 37A, 59, 84, 137B, 147, 158B, 191B, 200 **Mathematics II** **SE/TE:** 5, 10, 17, 25, 33, 54, 62, 68, 73-74, 81 **TE:** 18A, 34B, 55A, 75B, 83B, 111, 120, 151B, 164B, 191B **Mathematics III** **SE/TE:** 39, 50, 52, 56, 67-68, 97, 99, 108, 119, 139 **TE:** 27, 36, 40A-40B, 47A-47B, 48, 88, 95, 111, 123A, 135
MP.2 Reason abstractly and quantitatively.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 23, 27, 63, 86, 105, 111, 118, 131-133, 141, 145 **TE:** 12A, 63A, 83A, 104A, 112A, 137A, 144A, 151B, 219A, 236A **Mathematics II** **SE/TE:** 10, 31, 54, 62, 86, 88, 99, 109, 301, 352 **TE:** 47A, 83A, 89A, 205B, 212A, 229A-229B, 297A, 311A-311B, 319B, 328 **Mathematics III** **SE/TE:** 52, 108, 153, 164, 219, 245, 251, 260, 304, 313 **TE:** 47A, 69A, 84A, 131A, 136, 140B, 155, 177A, 181, 185A

SE = Student Edition **TE: = Teacher's Edition**

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MP.3 Construct viable arguments & critique the reasoning of others.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 11, 17, 28, 56, 67, 102, 116, 120, 170, 182 **TE:** 12, 18B, 24A, 53, 57A, 63A, 89B, 177A, 184A, 195 **Mathematics II** **SE/TE:** 9, 15-16, 23-24, 31, 38, 52-53, 60, 66, 341, 482 **TE:** 5B, 11A, 47A, 69B, 117A, 145A, 191B, 205A, 374A, 391A **Mathematics III** **SE/TE:** 10-11, 21, 28, 37, 44, 51, 66, 73, 82, 245 **TE:** 5A, 102, 109A, 113, 141, 154, 180, 355, 379A, 456
MP.4 Model with mathematics.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 44, 62, 68, 77, 88, 91, 128, 133, 157, 171-172 **TE:** 30, 51A, 69, 89A, 96A, 103, 164, 165A, 191A, 212 **Mathematics II** **SE/TE:** 26, 82, 131, 176, 190, 236, 327, 364, 444, 498 **TE:** 26A-26B, 82A-82B, 131A-131B, 176A-176B, 190A-190B, 236A-236B, 327A-327B, 364A-364B, 444A-444B, 498A-498B **Mathematics III** **SE/TE:** 53, 100, 162, 202, 246, 332, 363, 439, 480, 527 **TE:** 53A-53B, 100A-100B, 162A-162B, 202A-202B, 246A-246B, 332A-332B, 363A-363B, 439A-439B, 480A-480B, 527A-527B

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MP.5 Use appropriate tools strategically.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 23, 144, 148, 156, 168, 183, 197, 204, 210, 234 **TE:** 85, 98, 112B, 120A, 139, 160, 185, 224, 228A, 236B **Mathematics II** **SE/TE:** 17, 30, 32, 39, 60-61, 65, 76, 80, 147, 168 **TE:** 27A, 37, 64, 70, 75A, 84, 118, 170B, 237B, 283 **Mathematics III** **SE/TE:** 18, 43, 63, 111, 126, 145, 149, 171, 200, 276 **TE:** 13A, 34, 61A, 65, 101A, 147A, 169A, 270, 283, 369
MP.6 Attend to precision.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 10-11, 21, 54, 66, 87, 93, 109, 117, 142, 412-413 **TE:** 31A, 33, 57A, 89A, 104A, 250A, 319A, 335A, 363A, 396A **Mathematics II** **SE/TE:** 8, 15, 23-24, 33, 40, 43, 52, 79, 107, 121 **TE:** 13, 27A, 28, 51, 55B, 65, 89B, 126, 132B, 146 **Mathematics III** **SE/TE:** 12, 28-29, 37, 44, 50-51, 54, 73, 136, 138, 144 **TE:** 23A-23B, 47B, 62, 85, 127, 129, 136, 157, 173, 185B

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MP.7 Look for and make use of structure.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 42, 46, 55, 66-67, 75-76, 83, 89, 95, 100, 104 **TE:** 19, 26, 51A, 70A, 96A, 187, 207, 265B, 319B, 329 **Mathematics II** **SE/TE:** 17, 51, 123, 125, 135, 174, 218, 267, 352, 363 **TE:** 47B, 69A, 83A, 89A, 103A, 120, 216, 330, 383, 521B **Mathematics III** **SE/TE:** 33, 55, 82, 86, 147, 184, 189, 201, 250, 254 **TE:** 42, 80, 96, 143, 230, 336, 367, 409, 417, 443
MP.8 Look for and express regularity in repeated reasoning.	Mathematical practices are referenced throughout the enVision Integrated Mathematics series. The following citations are sample references. **Mathematics I** **SE/TE:** 16, 35, 60, 62, 127, 156, 162, 172, 197, 202-203 **TE:** 31A, 70A, 83A, 120A, 151A, 158A, 177A, 199A, 242A, 285A **Mathematics II** **SE/TE:** 11, 35, 57, 63, 67, 108, 137, 149, 155, 188 **TE:** 18B-18, 20, 22, 34A, 63A, 103A, 132A, 183A, 304A, 422A **Mathematics III** **SE/TE:** 56, 74, 85, 98, 116, 129, 145, 152, 160, 287 **TE:** 49, 92A, 101A, 142, 161, 247A, 297A, 340A, 393A, 423A

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Numbers and Quantities	
HSN-RN The Real Number System	
HSN-RN.A Extend the properties of exponents to rational exponents.	
HSN-RN.A.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. Example: For example, we define 5 to the 1/3 power to be the cube root of 5 because we want (5 to the 1/3 power)^3 = (5 to the 1/3 power)^3 to hold, so (5 to the 1/3 power)^3 must equal 5.	**Mathematics I** **SE:** 177-183 **TE:** 177A-183B **Mathematics II** **SE:** 11-17 **TE:** 11A-17B **Mathematics III** **SE:** 169-176, 177-184 **TE:** 169A-176B, 177A-184B
HSN-RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	**Mathematics I** **SE:** 177-183 **TE:** 177A-183B **Mathematics II** **SE:** 11-17 **TE:** 11A-17B **Mathematics III** **SE:** 169-176, 177-184 **TE:** 169A-176B, 177A-184B
HSN-RN.B Use properties of rational and irrational numbers.	
HSN-RN.B.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.	**Mathematics I** **TE:** 2B, 2G, 180, 219A, 277B **Mathematics II** **SE:** 5-10 **TE:** 5A-10B **Mathematics III** **SE/TE:** 104

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HSN-Q Quantities	
HSN-Q.A Reason quantitatively and use units to solve problems.	
HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	**Mathematics I** **SE/TE:** 22, 33, 55-56, 69, 93-95, 108, 112-113, 119, 227, 422 **TE:** 69A-69B, 431-434, 467-467B **Mathematics II** **SE/TE:** 10, 43, 68, 88, 94, 109, 163, 178, 373, 382 **TE:** 10B, 17A, 29, 33A, 36, 99A-99B, 130B **Mathematics III** **SE/TE:** 68, 113, 222, 429, 487, 565, 568, 570, 573, 580 **TE:** 275, 472B, 563, 587A-587B
HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.	**Mathematics I** **SE/TE:** 30, 69, 103, 164, 212, 249, 313, 356, 380, 467 **TE:** 30A-30B, 69A-69B, 103A-103B, 164A-164B, 212A-212B, 249A-249B, 313A-313B, 356A-356B, 380A-380B, 467A-467B **Mathematics II** **SE/TE:** 26, 82, 131, 176, 190, 236, 327, 364, 444, 498 **TE:** 26A-26B, 82A-82B, 131A-131B, 176A-176B, 190A-190B, 236A-236B, 327A-327B, 364A-364B, 444A-444B, 498A-498B **Mathematics III** **SE/TE:** 53, 100, 162, 202, 246, 332, 363, 439, 480, 527 **TE:** 53A-53B, 100A-100B, 162A-162B, 202A-202B, 246A-246B, 332A-332B, 363A-363B, 439A-439B, 480A-480B, 527A-527B

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HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	**Mathematics I** **SE/TE:** 238, 239, 240, 377, 379 **TE:** 11A, 23B, 47C, 79C, 212B, 236, 241B, 379A **Mathematics II** **SE/TE:** 20, 197, 219, 286, 324, 395, 443, 467, 576, 626 **TE:** 25A-25B, 33A-33B, 130B, 163A, 382B, 460B, 467B, 541B, 562B **Mathematics III** **SE/TE:** 46, 153, 184, 210, 220, 237, 259-260, 275, 303, 322 **TE:** 153B, 161B, 223A-223B, 242A-242B, 315B
HSN-CN The Complex Number System	
HSN-CN.A Perform arithmetic operations with complex numbers.	
HSN-CN.A.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.	**Mathematics II** **SE:** 183-189, 192, 200, 221-222 **TE:** 183A-189B, 192, 198A-198B, 204B **Mathematics III** **SE/TE:** 103, 104, 106-107, 169 **TE:** 101A, 108B, 169B, 387
HSN-CN.A.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	**Mathematics II** **SE:** 183-189 **TE:** 183A-189B
HSN-CN.A.3(+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	**Mathematics II** **SE:** 183-189 **TE:** 183A-189B **Mathematics III** **SE:** 101-108 **TE:** 101A-108B

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HSN-CN.B Represent complex numbers and their operations on the complex plane.	
HSN-CN.B.4(+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.	**Mathematics II** **SE/TE:** 189 **TE:** 189B **Mathematics III** **TE:** 352A, 363, 387
HSN-CN.B.5(+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. Example: For example, $(-1 + \sqrt{3}i)^3 = 8$ because $(-1 + \sqrt{3}i)$ has modulus 2 and argument 120°.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-CN.B.6(+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-CN.C Use complex numbers in polynomial identities and equations.	
HSN-CN.C.7 Solve quadratic equations with real coefficients that have complex solutions.	**Mathematics II** **SE/TE:** 183, 186-189, 192, 200, 221-222 **TE:** 183A-183B, 189A-189B, 192, 198A-198B, 204B **Mathematics III** **SE/TE:** 103, 104, 106-107, 169 **TE:** 101A, 108B, 169B, 387
HSN-CN.C.8(+) Extend polynomial identities to the complex numbers. Example: For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.	**Mathematics II** **SE/TE:** 186, 188 **TE:** 189B
HSN-CN.C.9(+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	**Mathematics II** **SE/TE:** 220-221 **TE:** 222 **Mathematics III** **SE/TE:** 103, 105-107 **TE:** 100B, 101A, 108B

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HSN-VM Vector and Matrix Quantities	
HSN-VM.A Represent and model with vector quantities.	
HSN-VM.A.1(+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\boldsymbol{v}$, $\lvert\boldsymbol{v}\rvert$, $\lvert\lvert\boldsymbol{v}\rvert\rvert$, v).	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.A.2(+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.A.3(+) Solve problems involving velocity and other quantities that can be represented by vectors.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.B Perform operations on vectors.	
HSN-VM.B.4(+) Add and subtract vectors.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.B.4a Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.B.4b Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.

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HSN-VM.B.4c Understand vector subtraction $\boldsymbol{v} - \boldsymbol{w}$ as $\boldsymbol{v} + (-\boldsymbol{w})$, where $-\boldsymbol{w}$ is the additive inverse of $\boldsymbol{w}$, with the same magnitude as $\boldsymbol{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.B.5(+) Multiply a vector by a scalar.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.B.5a Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $(v_x, v_y) = (cv_x, c\,v_y)$.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.B.5b Compute the magnitude of a scalar multiple $c\boldsymbol{v}$ using $\|\|c\boldsymbol{v}\|\| = \|c\|\boldsymbol{v}$. Compute the direction of $c\boldsymbol{v}$ knowing that when $\|c\|\boldsymbol{v} \neq 0$, the direction of $c\boldsymbol{v}$ is either along $\boldsymbol{v}$ (for $c > 0$) or against $\boldsymbol{v}$ (for $c < 0$).	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.C Perform operations on matrices and use matrices in applications.	
HSN-VM.C.6(+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.C.7(+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.

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HSN-VM.C.8(+) Add, subtract, and multiply matrices of appropriate dimensions.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.C.9(+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.C.10(+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.C.11(+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSN-VM.C.12(+) Work with 2 × 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.

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Algebra	
HSA-SSE Seeing Structure in Expressions	
HSA-SSE.A Interpret the structure of expressions	
HSA-SSE.A.1 Interpret expressions that represent a quantity in terms of its context.	**Mathematics I** **SE/TE:** 6-8, 14, 19, 22-23, 26, 29, 30, 31, 33, 38 **TE:** 7, 18B, 20, 24B, 30A-30B, 31, 37B, 69A-69B, 103A-103B **Mathematics II** **SE/TE:** 51, 54, 59, 61, 74, 81, 88, 105, 109, 113 **TE:** 83B, 88B, 130A, 132B, 170B, 175B, 197B, 204A, 255A, 262A **Mathematics III** **SE/TE:** 19, 30, 65, 67, 71, 73, 95, 99, 115, 125 **TE:** 91B, 92B, 139B, 146B, 153B, 161B, 201B, 210A, 219B, 234A
HSA-SSE.A.1a Interpret parts of an expression, such as terms, factors, and coefficients.	**Mathematics I** **SE/TE:** 9, 13-15, 19, 25, 27, 51, 53-54, 74, 99-102, 130 **TE:** 18A, 23B, 31A, 51A-51B, 70, 102B, 157A, 184, 198B, 272B **Mathematics II** **SE/TE:** 30, 47, 49, 52, 71, 75, 195, 199, 203, 215 **TE:** 47B, 54B, 55B, 69A, 83B, 89A-89B, 151B, 158A, 170A-170B, 249A **Mathematics III** **SE/TE:** 17, 20, 71, 74, 81, 83, 85, 102, 149, 230 **TE:** 61A-61B, 68B, 69A-69B, 75A, 84A-84B, 91B, 92B, 100A-100B, 131A, 140A

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HSA-SSE.A.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. Example: For example, interpret $(1+r)^n$ as the product of P and a factor not depending on P.	**Mathematics I** **SE:** 191-198 **TE:** 191A-198B **Mathematics II** **SE:** 18-25, 27-33, 47-54, 55-62, 63-68, 110-116, 117-123, 229-235, 237-242, 275-280 **TE:** 18A-25B, 27A-33B, 47A-54B, 55A-62B, 63A-68B, 110A-116B, 117A-123B, 229A-235B, 237A-242B, 275A-280B **Mathematics III** **SE:** 13-22, 23-30, 69-75, 109-116, 131-139, 140-146, 147-153, 185-192, 203-210, 227-234 **TE:** 13A-22B, 23A-30B, 69A-75B, 109A-116B, 131A-139B, 140A-146B, 147A-153B, 185A-192B, 203A-210B, 227A-234B
HSA-SSE.A.2 Use the structure of an expression to identify ways to rewrite it. Example: 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 $(x^2 - y^2)(x^2 + y^2)$.	**Mathematics I** **SE/TE:** 5, 9-10, 13, 15, 28, 44, 46, 58, 107, 146 **TE:** 11B, 12A-12B, 17B, 18A-18B, 23B, 24B, 43B, 76B, 183B, 265B **Mathematics II** **SE:** 63-68, 69-74, 75-81, 83-88, 89-94, 110-116, 117-123, 151-157, 158-163, 212-222 **TE:** 63A-68B, 69A-74B, 75A-81B, 83A-88B, 89A-94B, 110A-116B, 117A-123B, 151A-157B, 158A-163B, 212A-222B **Mathematics III** **SE:** 76-83, 84-91, 92-99, 169-176, 177-184, 267-272, 379-386 **TE:** 76A-83B, 84A-91B, 92A-99B, 169A-176B, 177A-184B, 267A-272B, 379A-386B

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HSA-SSE.B Write expressions in equivalent forms to solve problems	
HSA-SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	**Mathematics I** **SE:** 51-56, 57-62, 63-68, 137-143, 144-150, 151-157, 184-190, 191-198, 206-211 **TE:** 48C, 51A-56B, 57A-62B, 63A-68B, 137A-143B, 144A-150B, 151A-157B, 184A-190B, 191A-198B, 206A-211B **Mathematics II** **SE:** 63-68, 69-74, 75-81, 83-88, 89-94, 110-116, 117-123, 151-157, 158-163, 212-222 **TE:** 63A-68B, 69A-74B, 75A-81B, 83A-88B, 89A-94B, 110A-116B, 117A-123B, 151A-157B, 158A-163B, 212A-222B **Mathematics III** **SE:** 76-83, 84-91, 92-99, 169-176, 177-184, 267-272, 379-386 **TE:** 76A-83B, 84A-91B, 92A-99B, 169A-176B, 177A-184B, 267A-272B, 379A-386B
HSA-SSE.B.3a Factor a quadratic expression to reveal the zeros of the function it defines.	**Mathematics II** **SE:** 69-74, 75-81, 83-88, 89-94, 151-157 **TE:** 69A-74B, 75A-81B, 83A-88B, 89A-94B, 151A-157B **Mathematics III** In Integrated Mathematics III, students find zeros of polynomials and roots of polynomial equations. **SE:** 92-99, 101-108 **TE:** 92A-99B, 101A-108B
HSA-SSE.B.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	**Mathematics II** **SE:** 191-197 **TE:** 191A-197B

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HSA-SSE.B.3c Use the properties of exponents to transform expressions for exponential functions. Example: For example the expression 1.15 to the *t* power can be rewritten as ((1.15 to the 1/12 power) to the 12*t* power) is approximately equal to (1.012 to the 12*t* power) to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	**Mathematics I** **SE:** 177-183, 184-190, 191-198, 199-205, 206-211, 212 **TE:** 177A-183B, 184A-190B, 191A-198B, 199A-205B, 206A-211B, 212-212B **Mathematics II** **SE:** 11-17, 18-25 **TE:** 11A-17B, 18A-25B **Mathematics III** **SE:** 169-176, 177-184, 227-234, 235-245 **TE:** 169A-176B, 177A-184B, 227A-234B, 235A-245B
HSA-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. Example: For example, calculate mortgage payments.	**Mathematics I** Geometric sequences are introduced **SE:** 199-205 **TE:** 199A-205B **Mathematics III** **SE/TE:** 280-288 **TE:** 280A-288B
HSA-APR Arithmetic with Polynomials and Rational Expressions	
HSA-APR.A Perform arithmetic operations on polynomials	
HSA-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.	**Mathematics II** **SE:** 47-54, 55-62, 63-68 **TE:** 47A-54B, 55A-62B, 63A-68B **Mathematics III** **SE:** 69-75, 76-83 **TE:** 69A-75B, 76A-83B
HSA-APR.B Understand the relationship between zeros and factors of polynomials	
HSA-APR.B.2 Know and apply the Remainder Theorem: For a polynomial (x) and a number a, the remainder on division by $x - a$ is (a), so (a) = 0 if and only if ($x - a$) is a factor of (x).	**Mathematics III** **SE:** 84-91 **TE:** 84A-91B

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HSA-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.	**Mathematics II** **SE:** 69-74, 75-81, 83-88, 89-94, 103-109, 110-116, 117-123, 145-150, 151-157 **TE:** 69A-74B, 75A-81B, 83A-88B, 89A-94B, 103A-109B, 110A-116B, 117A-123B, 145A-150B, 151A-157B **Mathematics III** **SE:** 92-99 **TE:** 92A-99B
HSA-APR.C Use polynomial identities to solve problems	
HSA-APR.C.4 Prove polynomial identities and use them to describe numerical relationships. Example: For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.	**Mathematics II** **SE:** 63-68, 89-94, 212-222 **TE:** 63A-68B, 89A-94B, 212A-222B **Mathematics III** **SE:** 76-83 **TE:** 76A-83B
HSA-APR.C.5(+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.	**Mathematics III** **SE/TE:** 76-83 **TE:** 76A-83B
HSA-APR.D Rewrite rational expressions	
HSA-APR.D.6 Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	**Mathematics III** **SE:** 131-139, 140-146, 147-153 **TE:** 131A-139B, 140A-146B, 147A-153B
HSA-APR.D.7(+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	**Mathematics III** **SE:** 140-146, 147-153 **TE:** 140A-146B, 147A-153B

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HSA-CED Creating Equations	
HSA-CED.A Create equations that describe numbers or relationships	
HSA-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.	**Mathematics I** **SE:** 5-11, 12-17, 24-29, 31-36, 89-95, 184-190, 191-198 **TE:** 5A-11B, 12A-17B, 24A-29B, 31A-36B, 89A-95B, 184A-190B, 191A-198B **Mathematics II** **SE:** 145-150, 151-157, 164-169, 191-197, 198-204 **TE:** 145A-150B, 151A-157B, 164A-169B, 191A-197B, 198A-204B **Mathematics III** **SE:** 40-46, 101-108, 154-161, 193-201, 273-279 **TE:** 40A-46B, 101A-108B, 154A-161B, 193A-201B, 273A-279B
HSA-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	**Mathematics I** **SE:** 18-23, 51-56, 57-62, 63-68, 70-76, 89-95, 96-102, 184-190, 191-198, 206-211 **TE:** 18A-23B, 51A-56B, 57A-62B, 63A-68B, 70A-76B, 89A-95B, 96A-102B, 184A-190B, 191A-198B, 206A-211B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 23-30, 61-68, 131-139, 185-192, 227-234, 235-245, 247-253, 261-266, 323-331, 333-339 **TE:** 23A-30B, 61A-68B, 131A-139B, 185A-192B, 227A-234B, 235A-245B, 247A-253B, 261A-266B, 323A-331B, 333A-339B

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HSA-CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. Example: For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	**Mathematics I** **SE:** 5-11, 12-17, 24-29, 31-36, 37-43, 137-143, 144-150, 151-157, 158-163, 165-170 **TE:** 5A-11B, 12A-17B, 24A-29B, 31A-36B, 37A-43B, 137A-143B, 144A-150B, 151A-157B, 158A-163B, 165A-170B **Mathematics II** **SE:** 145-150, 151-157, 164-169, 170-175, 191-197, 198-204, 205-211 **TE:** 145A-150B, 151A-157B, 164A-169B, 170A-175B, 191A-197B, 198A-204B, 205A-211B **Mathematics III** **SE:** 40-46, 47-52, 101-108, 154-161, 193-201, 273-279, 355-362 **TE:** 40A-46B, 47A-52B, 101A-108B, 154A-161B, 193A-201B, 273A-279B, 355A-362B
HSA-CED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. Example: For example, rearrange Ohm's law $V = IR$ to highlight resistance R.	**Mathematics I** **SE:** 18-23 **TE:** 18A-23B **Mathematics II** **SE/TE:** 50 **Mathematics III** **TE:** 201B

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HSA-REI Reasoning with Equations and Inequalities	
HSA-REI.A Understand solving equations as a process of reasoning and explain the reasoning	
HSA-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.	**Mathematics I** **SE:** 5-11, 12-17, 37-39, 41-42, 178-183 **TE:** 5A-11B, 12A-17B, 37A-39, 43A-43B, 178-183B **Mathematics II** **SE:** 145-150, 151-157, 164-169, 191-197, 198-204 **TE:** 145A-150B, 151A-157B, 164A-169B, 191A-197B, 198A-204B **Mathematics III** **SE:** 40-46, 101-108, 154-161, 193-201, 273-279, 355-362 **TE:** 40A-46B, 101A-108B, 154A-161B, 193A-201B, 273A-279B, 355A-362B
HSA-REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	**Mathematics III** **SE:** 154-161, 193-201 **TE:** 154A-161B, 193A-201B
HSA-REI.B Solve equations and inequalities in one variable	
HSA-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**Mathematics I** **SE:** 5-11, 12-17, 18-23, 24-29, 31-36 **TE:** 5A-11B, 12A-17B, 18A-23B, 24A-29B, 31A-36B **Mathematics II** **TE:** 50 **Mathematics III** **SE:** 40-46 **TE:** 40A-46B, 201B
HSA-REI.B.4 Solve quadratic equations in one variable.	**Mathematics II** **SE:** 145-150, 151-157, 164-169, 191-197, 198-204 **TE:** 145A-150B, 151A-157B, 164A-169B, 191A-197B, 198A-204B **Mathematics III** **SE:** 40-46, 92-99, 101-108 **TE:** 40A-46B, 92A-99B, 101A-108B

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HSA-REI.B.4a 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.	**Mathematics II** **SE:** 191-197, 198-204 **TE:** 191A-197B, 198A-204B
HSA-REI.B.4b 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.	**Mathematics II** **SE:** 145-150, 151-157, 164-169, 191-197, 198-204 **TE:** 145A-150B, 151A-157B, 164A-169B, 191A-197B, 198A-204B **Mathematics III** **SE:** 40-46, 92-99, 101-108 **TE:** 40A-46B, 92A-99B, 101A-108B
HSA-REI.C Solve systems of equations	
HSA-REI.C.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	**Mathematics I** **SE:** 144-150, 151-157 **TE:** 144A-150B, 151A-157B **Mathematics II** **SE:** 170-175, 205-211 **TE:** 170A-175B, 205A-211B **Mathematics III** **SE:** 47A-52B **TE:** 47A-52B
HSA-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	**Mathematics I** **SE:** 137-143, 144-150, 151-157 **TE:** 137A-143B, 144A-150B, 151A-157B **Mathematics II** **SE:** 170-175, 205-211 **TE:** 170A-175B, 205A-211B **Mathematics III** **SE:** 47A-52B **TE:** 47A-52B

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HSA-REI.C.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. Example: For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.	**Mathematics II** **SE:** 170-175, 205-211 **TE:** 170A-175B, 205A-211B **Mathematics III** **SE:** 47-52 **TE:** 47A-52B
HSA-REI.C.8(+) Represent a system of linear equations as a single matrix equation in a vector variable.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSA-REI.C.9(+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSA-REI.D Represent and solve equations and inequalities graphically	
HSA-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).	**Mathematics I** **SE/TE:** 51-56, 57-62, 63-68, 70-76, 137-143 **TE:** 51A-56B, 57A-62B, 63A-68B, 70A-76B, 137A-143B **Mathematics II** **SE:** 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 256-262, 263-268, 269-274 **TE:** 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 256A-262B, 263A-268B, 269A-274B **Mathematics III** **SE:** 5-12, 13-22, 40-46, 47-52, 61-68, 109-116, 123-130, 131-139, 185-192, 261-266 **TE:** 5A-12B, 13A-22B, 40A-46B, 47A-52B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 261A-266B

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HSA-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 (x) and/or (x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	**Mathematics I** **SE:** 137-143 **TE:** 137A-143B **Mathematics II** **SE:** 170-175 **TE:** 170A-175B **Mathematics III** **SE:** 40-46 **TE:** 40A-46B
HSA-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.	**Mathematics I** **SE:** 158-163, 165-170 **TE:** 158A-163B, 165A-170B **Mathematics II** **SE/TE:** 207-208 **Mathematics III** **SE:** 47-52 **TE:** 47A-52B
Functions	
HSF-IF Interpreting Functions	
HSF-IF.A Understand the concept of a function and use function notation	
HSF-IF.A.1 Understand that a function from one set (called the domain) to another set (called the 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 (x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = (x)$.	**Mathematics I** **SE:** 83-88, 89-95, 184-190 **TE:** 83A-88B, 89A-95B, 184A-190B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116, 123-130, 131-139, 185-192, 227-234, 261-266 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 227A-234B, 261A-266B

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HSF-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.	**Mathematics I** **SE:** 83-88, 89-95, 96-102, 184-190, 206-211 **TE:** 83A-88B, 89A-95B, 96A-102B, 184A-190B, 206A-211B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116, 123-130, 131-139, 185-192, 227-234, 261-266 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 227A-234B, 261A-266B
HSF-IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. Example: For example, the Fibonacci sequence is defined recursively by (0) = (1) = 1, (*n*+1) = (*n*) + (*n*-1) for *n* greater than or equal to 1.	**Mathematics I** **SE:** 104-111, 199-205 **TE:** 104A-111B, 199A-205B **Mathematics II** **SE/TE:** 439 **TE:** 460B, 576B, 593B **Mathematics III** **SE:** 31-39, 280-288 **TE:** 31A-39B, 280A-288B, 518B, 535B

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HSF-IF.B Interpret functions that arise in applications in terms of the context	
HSF-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.	**Mathematics I** **SE:** 83-88, 89-95, 96-102, 184-190, 206-211 **TE:** 83A-88B, 89A-95B, 96A-102B, 184A-190B, 206A-211B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116, 123-130, 131-139, 185-192, 227-234, 261-266 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 227A-234B, 261A-266B
HSF-IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. Example: For example, if the function (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.	**Mathematics I** **SE:** 83-88, 89-95, 96-102, 184-190, 206-211 **TE:** 83A-88B, 89A-95B, 96A-102B, 184A-190B, 206A-211B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116, 123-130, 131-139, 185-192, 227-234, 261-266 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 227A-234B, 261A-266B

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HSF-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.	**Mathematics I** **SE:** 83-88, 89-95, 96-102, 184-190, 206-211 **TE:** 83A-88B, 89A-95B, 96A-102B, 184A-190B, 206A-211B **Mathematics II** **SE/TE:** 27-33, 34-40, 103-109, 132-139, 242, 248 **TE:** 243A, 248A-248B, 270 **Mathematics III** **SE/TE:** 9, 11-12, 63, 67, 68, 231, 233, 251, 263, 265 **TE:** 5A-5B, 12A, 234A, 249, 253A-253B, 266A-266B, 323A
HSF-IF.C Analyze functions using different representations	
HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	**Mathematics I** **SE:** 83-88, 89-95, 96-102, 184-190, 206-211 **TE:** 83A-88B, 89A-95B, 96A-102B, 184A-190B, 206A-211B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116, 123-130, 131-139, 185-192, 227-234, 261-266 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 227A-234B, 261A-266B

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HSF-IF.C.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.	**Mathematics I** **SE:** 83-88, 89-95, 96-102 **TE:** 83A-88B, 89A-95B, 96A-102B **Mathematics II** **SE:** 103-109, 110-116, 117-123, 124-130 **TE:** 103A-109B, 110A-116B, 117A-123B, 124A-130B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B
HSF-IF.C.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	**Mathematics I** **SE:** 83-88, 89-95, 96-102 **TE:** 83A-88B, 89A-95B, 96A-102B **Mathematics II** **SE:** 27-33, 34-40, 229-235, 237-242, 243-248, 249-255 **TE:** 27A-33B, 34A-40B, 229A-235B, 237A-242B, 243A-248B, 249A-255B **Mathematics III** **SE:** 23-30, 40-46, 185-192 **TE:** 23A-30B, 40A-46B, 185A-192B
HSF-IF.C.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	**Mathematics II** **SE:** 103-109, 110-116, 117-123, 124-130 **TE:** 103A-109B, 110A-116B, 117A-123B, 124A-130B **Mathematics III** **SE:** 61-68, 92-99, 109-116 **TE:** 61A-68B, 92A-99B, 109A-116B
HSF-IF.C.7d(+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	**Mathematics III** **SE:** 123-130, 131-139 **TE:** 123A-130B, 131A-139B

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HSF-IF.C.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	**Mathematics I** **SE:** 184-190, 206-211 **TE:** 184A-190B, 206A-211B **Mathematics II** **SE:** 18-25 **TE:** 18A-25B **Mathematics III** **SE:** 227-234, 235-245, 246, 261-266, 323-331, 333-339, 340-347 **TE:** 227A-234B, 235A-245B, 246A-246B, 261A-266B, 323A-331B, 333A-339B, 340A-347B
HSF-IF.C.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	**Mathematics I** **SE:** 51-56, 57-62, 63-68, 70-76 **TE:** 51A-56B, 57A-62B, 63A-68B, 70A-76B **Mathematics II** **SE:** 103-109, 110-116, 117-123 **TE:** 103A-109B, 110A-116B, 117A-123B **Mathematics III** **SE:** 5-12, 13-22, 61-68, 101-108, 109-116, 379-386 **TE:** 5A-12B, 13A-22B, 61A-68B, 101A-108B, 109A-116B, 379A-386B
HSF-IF.C.8a 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.	**Mathematics II** **SE:** 69-74, 75-81, 83-88, 89-94, 151-157, 191-197 **TE:** 69A-74B, 75A-81B, 83A-88B, 89A-94B, 151A-157B, 191A-197B **Mathematics III** **SE:** 76-83, 92-99 **TE:** 76A-83B, 92A-99B

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HSF-IF.C.8b Use the properties of exponents to interpret expressions for exponential functions. Example: For example, identify percent rate of change in functions such as y = (1.02) to the *t* power, *y* = (0.97) to the *t* power, *y* = (1.01) to the 12*t* power, *y* = (1.2) to the *t*/10 power, and classify them as representing exponential growth or decay.	**Mathematics I** **SE:** 184-190, 191-198, 199-205, 206-211 **TE:** 184A-190B, 191A-198B, 199A-205B, 206A-211B **Mathematics II** **SE:** 18-25 **TE:** 18A-25B **Mathematics III** **SE:** 227-234, 235-245 **TE:** 227A-234B, 235A-245B
HSF-IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Example: For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	**Mathematics I** **SE/TE:** 186, 209, 211 **TE:** 174F, 206A **Mathematics II** **SE/TE:** 30 **TE:** 124B, 131 **Mathematics III** **SE/TE:** 72 **TE:** 69A

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HSF-BF Building Functions	
HSF-BF.A Build a function that models a relationship between two quantities	
HSF-BF.A.1 Write a function that describes a relationship between two quantities.	**Mathematics I** **SE:** 89-95, 96-102, 103, 104-111, 112-119, 120-128, 184-190, 191-198, 206-211, 212 **TE:** 89A-95B, 96A-102B, 103A-103B, 104A-111B, 112A-119B, 120A-128B, 184A-190B, 191A-198B, 206A-211B, 212A-212B **Mathematics II** **SE:** 18-25, 27-33, 34-40, 103-109, 110-116, 117-123, 124-130, 229-235, 237-242, 243-248 **TE:** 18A-25B, 27A-33B, 34A-40B, 103A-109B, 110A-116B, 117A-123B, 124A-130B, 229A-235B, 237A-242B, 243A-248B **Mathematics III** **SE:** 5-12, 13-22, 23-30, 61-68, 109-116, 123-130, 131-139, 185-192, 227-234, 261-266 **TE:** 5A-12B, 13A-22B, 23A-30B, 61A-68B, 109A-116B, 123A-130B, 131A-139B, 185A-192B, 227A-234B, 261A-266B
HSF-BF.A.1a Determine an explicit expression, a recursive process, or steps for calculation from a context.	**Mathematics I** **SE:** 104-111, 199-205 **TE:** 104A-111B, 199A-205B **Mathematics II** **SE/TE:** 188 **TE:** 183A **Mathematics III** **SE:** 31-39, 280-288 **TE:** 31A-39B, 280A-288B

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HSF-BF.A.1b Combine standard function types using arithmetic operations. Example: 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.	**Mathematics I** **SE:** 96-102, 206-211 **TE:** 96A-102B, 206A-211B **Mathematics II** **SE:** 275-280 **TE:** 275A-280B **Mathematics III** **SE:** 203-210 **TE:** 203A-210B
HSF-BF.A.1c(+) Compose functions. Example: For example, if (y) is the temperature in the atmosphere as a function of height, and (t) is the height of a weather balloon as a function of time, then ((t)) is the temperature at the location of the weather balloon as a function of time.	**Mathematics III** **SE:** 203-210, 211-219 **TE:** 203A-210B, 211A-219B
HSF-BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	**Mathematics I** **SE:**104-111, 199-205 **TE:** 104A-111B, 199A-205B, 248B **Mathematics III** **SE:** 31-39, 280-288 **TE:** 31A-39B, 280A-288B
HSF-BF.B Build new functions from existing functions	
HSF-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.	**Mathematics I** **SE:** 96-102, 206-211 **TE:** 96A-102B, 206A-211B **Mathematics II** **SE:** 256-262, 263-268, 269-274 **TE:** 256A-262B, 263A-268B, 269A-274B **Mathematics III** **SE:** 13-22, 109-116, 131-139, 185-192, 227-234, 262, 265, 340-347 **TE:** 13A-22B, 109A-116B, 131A-139B, 185A-192B, 227A-234B, 340A-347B

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HSF-BF.B.4 Find inverse functions.	**Mathematics II** **SE:** 281-286 **TE:** 281A-286B **Mathematics III** **SE:** 211-219, 355-362 **TE:** 211A-219B, 355A-362B
HSF-BF.B.4a Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. Example: For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.	**Mathematics II** **SE:** 281-286 **TE:** 281A-286B **Mathematics III** **SE:** 211-219, 355-362 **TE:** 211A-219B, 355A-362B
HSF-BF.B.4b(+) Verify by composition that one function is the inverse of another.	**Mathematics III** **SE/TE:** 215, 217 **TE:** 211A, 216, 219B
HSF-BF.B.4c(+) Read values of an inverse function from a graph or a table, given that the function has an inverse.	**Mathematics II** **SE:** 281-286 **TE:** 281A-286B **Mathematics III** **SE:** 211-219 **TE:** 211A-219B
HSF-BF.B.4d(+) Produce an invertible function from a non-invertible function by restricting the domain.	**Mathematics II** **SE:** 281-286 **TE:** 281A-286B **Mathematics III** **SE:** 211-219, 355-362 **TE:** 211A-219B, 355A-362B
HSF-BF.B.5(+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	**Mathematics III** **SE:** 254-260, 261-266, 267-272, 273-279 **TE:** 254A-260B, 261A-266B, 267A-272B, 273A-279B

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HSF-LE Linear, Quadratic, and Exponential Models	
HSF-LE.A Construct and compare linear, quadratic, and exponential models and solve problems	
HSF-LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.	**Mathematics I** **SE:** 89-95, 96-102, 103, 184-190, 191-198, 206-211, 212 **TE:** 89A-95B, 96A-102B, 103-103B, 104A-111B, 184A-190B, 191A-198B, 206A-211B, 212-212B **Mathematics II** **SE:** 18-25, 26, 132-139 **TE:** 18A-25B, 26A-26B, 132A-139B **Mathematics III** **SE:** 227-234, 235-245, 247-253 **TE:** 227A-234B, 235A-245B, 247A-253B
HSF-LE.A.1a Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	**Mathematics I** **SE:** 89-95, 96-102, 104-111, 184-190, 191-198, 199-205, 206-211 **TE:** 89A-95B, 96A-102B, 104A-111B, 184A-190B, 191A-198B, 199A-205B, 206A-211B **Mathematics II** **SE:** 18-25, 26, 132-139 **TE:** 18A-25B, 26A-26B, 132A-139B **Mathematics III** **SE/TE:** 227-234, 235-245, 247-253 **TE:** 227A-234B, 235A-245B, 247A-253B
HSF-LE.A.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	**Mathematics I** **SE:** 89-95, 96-102, 103, 104-111 **TE:** 89A-95B, 96A-102B, 103-103B, 104A-111B **Mathematics II** **SE:** 132-139 **TE:** 132A-139B **Mathematics III** **SE:** 247-253 **TE:** 247A-253B

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HSF-LE.A.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	**Mathematics I** **SE:** 184-190, 191-198, 199-205, 206-211, 212 **TE:** 184A-190B, 191A-198B, 199A-205B, 206A-211B, 212-212B **Mathematics II** **SE:** 18-25, 26, 132-139 **TE:** 18A-25B, 26A-26B, 132A-139B **Mathematics III** **SE:** 227-234, 235-245, 247-253 **TE:** 227A-234B, 235A-245B, 247A-253B
HSF-LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	**Mathematics I** **SE:** 89-95, 96-102, 104-111, 184-190, 191-198, 199-205, 206-211 **TE:** 89A-95B, 96A-102B, 104A-111B, 184A-190B, 191A-198B, 199A-205B, 206A-211B **Mathematics II** **SE:** 18-25, 26, 132-139 **TE:** 18A-25B, 26A-26B, 132A-139B **Mathematics III** **SE/TE:** 227-234, 235-245, 247-253 **TE:** 227A-234B, 235A-245B, 247A-253B
HSF-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	**Mathematics I** **SE/TE:** 187, 189-190, 192 **TE:** 184A-184B **Mathematics II** **SE/TE:** 18-25, 26, 132-139 **TE:** 18A-25B, 26A-26B, 132A-139B **Mathematics III** **SE/TE:** 227-234, 235-245, 247-253 **TE:** 227A-234B, 235A-245B, 247A-253B

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HSF-LE.A.4 For exponential models, express as a logarithm the solution to *ab* to the *ct* power = *d* where *a*, *c*, and *d* are numbers and the base *b* is 2, 10, or *e*; evaluate the logarithm using technology.	**Mathematics III** **SE/TE:** 273-279 **TE:** 273A-279B
HSF-LE.B Interpret expressions for functions in terms of the situation they model	
HSF-LE.B.5 Interpret the parameters in a linear or exponential function in terms of a context.	**Mathematics I** **SE:** 89-95, 96-102, 103, 120-128, 184-190, 191-198, 206-211, 212 **TE:** 89A-95B, 96A-102B, 103-103B, 104A-111B, 120A-128B, 184A-190B, 191A-198B, 206A-211B, 212-212B **Mathematics II** **SE:** 18-25, 26, 132-139 **TE:** 18A-25B, 26A-26B, 132A-139B **Mathematics III** **SE:** 227-234, 235-245, 247-253 **TE:** 227A-234B, 235A-245B, 247A-253B
HSF-TF Trigonometric Functions	
HSF-TF.A Extend the domain of trigonometric functions using the unit circle	
HSF-TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	**Mathematics II** **SE:** 569-576 **TE:** 569A-576B **Mathematics III** **SE:** 305-315 **TE:** 305A-315B
HSF-TF.A.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	**Mathematics III** **SE:** 305-315, 316-322 **TE:** 305A-315B, 316A-322B

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HSF-TF.A.3(+) Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π–*x*, π+*x*, and 2π–*x* in terms of their values for *x*, where *x* is any real number.	**Mathematics III** **SE/TE:** 297-304, 305-315 **TE:** 297A-304B, 305A-315B
HSF-TF.A.4(+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	**Mathematics III** **SE:** 305-315, 316-322, 323-331 **TE:** 305A-315B, 316A-322B, 323A-331B
HSF-TF.B Model periodic phenomena with trigonometric functions	
HSF-TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	**Mathematics III** **SE:** 323-331, 333-339 **TE:** 323A-331B, 333A-339B
HSF-TF.B.6(+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	**Mathematics III** **SE:** 355-362 **TE:** 355A-362B
HSF-TF.B.7(+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.	**Mathematics III** **SE:** 355-362, 363, 364-372, 373-378 **TE:** 355A-362B, 363A-363B, 364A-372B, 373A-378B
HSF-TF.C Prove and apply trigonometric identities	
HSF-TF.C.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.	**Mathematics II** **SE/TE:** 468-470 **Mathematics III** **SE:** 316-322, 379-386 **TE:** 316A-322B, 379A-386B
HSF-TF.C.9(+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	**Mathematics III** **SE:** 379-386 **TE:** 379A-386B

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Geometry	
HSG-CO Congruence	
HSG-CO.A Experiment with transformations in the plane	
HSG-CO.A.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	**Mathematics I** **SE:** 219-227, 285-291, 292-298, 299-305, 306-312, 415-422 **TE:** 219A-227B, 285A-291B, 292A-298B, 299A-305B, 306A-312B, 415A-422B **Mathematics II** **SE:** 304-310, 311-318, 569-576 **TE:** 304A-310B, 311A-318B, 569A-576B **Mathematics III** **SE:** 466-472, 511-518 **TE:** 466A-472B, 511A-518B
HSG-CO.A.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	**Mathematics I** **SE:** 319-326, 327-334, 335-342, 343-349, 350-355 **TE:** 319A-326B, 327A-334B, 335A-342B, 343A-349B, 350A-355B **Mathematics II** **SE:** 413-421, 422-428 **TE:** 413A-421B, 422A-428B
HSG-CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	**Mathematics I** **SE:** 350-355, 356 **TE:** 350A-355B, 356A-356B
HSG-CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	**Mathematics I** **SE:** 319-326, 327-334, 335-342, 343-349, 350-355 **TE:** 319A-326B, 327A-334B, 335A-342B, 343A-349B, 350A-355B
HSG-CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	**Mathematics I** **SE:** 319-326, 327-334, 335-342, 343-349, 350-355 **TE:** 319A-326B, 327A-334B, 335A-342B, 343A-349B, 350A-355B

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HSG-CO.B Understand congruence in terms of rigid motions	
HSG-CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	**Mathematics I** **SE:** 343-349, 363-370 **TE:** 343A-349B, 363A-370B
HSG-CO.B.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	**Mathematics I** **SE:** 363-370, 381-387, 388-395, 396-401, 402-407 **TE:** 363A-370B, 381A-387B, 388A-395B, 396A-401B, 402A-407B
HSG-CO.B.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	**Mathematics I** **SE:** 363-370, 381-387, 388-395, 396-401, 402-407 **TE:** 363A-370B, 381A-387B, 388A-395B, 396A-401B, 402A-407B
HSG-CO.C Prove geometric theorems	
HSG-CO.C.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.	**Mathematics I** **SE/TE:** 232, 265-271, 285-291, 292-298, 299-305, 306-312, 320, 324, 413 **TE:** 265A-271B, 285A-291B, 292A-298B, 299A-305B, 306A-312B **Mathematics II** **SE:** 304-310, 311-318 **TE:** 304A-310B, 311A-318B **Mathematics III** **SE:** 466-472 **TE:** 466A-472B
HSG-CO.C.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.	**Mathematics I** **SE/TE:** 71, 292, 299-305, 371-379 **TE:** 298B, 299A-305B, 371A-379B **Mathematics II** **SE/TE:** 319-326, 328-335, 336-342, 343-348, 445-451 **TE:** 319A-326B, 328A-335B, 336A-342B, 343A-348B, 445A-451B

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HSG-CO.C.11 Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.	**Mathematics I** **SE/TE:** 290, 351, 408-414 **TE:** 291, 353, 408A-414B **Mathematics II** **SE:** 374-382, 383-390, 391-397, 398-405 **TE:** 374A-382B, 383A-390B, 391A-397B, 398A-405B
HSG-CO.D Make geometric constructions	
HSG-CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	**Mathematics I** **SE/TE:** 228-235, 297, 300, 339-340 **TE:** 228A-235B, 295, 336, 373 **Mathematics III** **SE:** 455-465 **TE:** 455A-465B
HSG-CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	**Mathematics I** **SE/TE:** 418, 421 **Mathematics III** **SE:** 455-465 **TE:** 455A-465B
HSG-SRT Similarity, Right Triangles, and Trigonometry	
HSG-SRT.A Understand similarity in terms of similarity transformations	
HSG-SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor:	**Mathematics II** **SE:** 413-421, 422-428 **TE:** 413A-421B, 422A-428B
HSG-SRT.A.1a 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.	**Mathematics II** **SE:** 413-421 **TE:** 413A-421B
HSG-SRT.A.1b The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	**Mathematics II** **SE:** 413-421 **TE:** 413A-421B

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HSG-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.	**Mathematics II** **SE:** 422-428 **TE:** 422A-428B
HSG-SRT.A.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	**Mathematics II** **SE:** 422-428, 429-435 **TE:** 422A-428B, 429A-435B
HSG-SRT.B Prove theorems involving similarity	
HSG-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.	**Mathematics II** **SE:** 436-443, 445-451, 452-460, 461-470 **TE:** 436A-443B, 445A-451B, 452A-460B, 461A-467B, 468-470
HSG-SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	**Mathematics I** **SE:** 381-387, 388-395, 396-401, 402-407 **TE:** 381A-387B, 388A-395B, 396A-401B, 402A-407B **Mathematics II** **SE:** 436-443, 445-451, 452-460, 461-470 **TE:** 436A-443B, 445A-451B, 452A-460B, 461A-467B, 468-470
HSG-SRT.C Define trigonometric ratios and solve problems involving right triangles	
HSG-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.	**Mathematics II** **SE:** 436-443, 452-460, 461-470 **TE:** 436A-443B, 452A-460B, 461A-467B, 468-470
HSG-SRT.C.7 Explain and use the relationship between the sine and cosine of complementary angles.	**Mathematics II** **TE:** 463, 465

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HSG-SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	**Mathematics II** **SE:** 452-460, 461-470 **TE:** 452A-460B, 461A-467B, 468-470 **Mathematics III** **SE:** 373-378 **TE:** 373A-378B
HSG-SRT.D Apply trigonometry to general triangles	
HSG-SRT.D.9(+) Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	**Mathematics III** **SE/TE:** 375-378 **TE:** 378A-378B
HSG-SRT.D.10(+) Prove the Laws of Sines and Cosines and use them to solve problems.	**Mathematics III** **SE:** 364-372, 373-378 **TE:** 364A-372B, 373A-378B
HSG-SRT.D.11(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	**Mathematics III** **SE:** 364-372, 373-378 **TE:** 364A-372B, 373A-378B
HSG-C Circles	
HSG-C.A Understand and apply theorems about circles	
HSG-C.A.1 Prove that all circles are similar.	**Mathematics II** **SE:** 422-428 **TE:** 422A-428B
HSG-C.A.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	**Mathematics I** **SE:** 415-422 **TE:** 415A-422B **Mathematics II** **SE:** 577-584, 586-593, 594-600, 601-608 **TE:** 577A-584B, 586A-593B, 594A-600B, 601A-608B **Mathematics III** **SE:** 519-526, 528-535, 536-542, 543-550 **TE:** 519A-526B, 528A-535B, 536A-542B, 543A-550B

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HSG-C.A.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	**Mathematics II** **SE/TE:** 322-326 **TE:** 326A-326B **Mathematics III** **SE/TE:** 463-465
HSG-C.A.4(+) Construct a tangent line from a point outside a given circle to the circle.	**Mathematics II** **SE/TE:** 578, 581 **TE:** 584A-584B **Mathematics III** **SE/TE:** 520, 523 **TE:** 526A-526B
HSG-C.B Find arc lengths and areas of sectors of circles	
HSG-C.B.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	**Mathematics II** **SE:** 569-576 **TE:** 569A-576B **Mathematics III** **SE:** 511-518 **TE:** 511A-518B
HSG-GPE Expressing Geometric Properties with Equations	
HSG-GPE.A Translate between the geometric description and the equation for a conic section	
HSG-GPE.A.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	**Mathematics II** **SE:** 550-555 **TE:** 550A-555B **Mathematics III** **SE:** 491-496 **TE:** 491A-496B
HSG-GPE.A.2 Derive the equation of a parabola given a focus and directrix.	**Mathematics II** **SE:** 556-562 **TE:** 556A-562B **Mathematics III** **SE:** 497-503 **TE:** 497A-503B

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HSG-GPE.A.3(+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	enVision Integrated Mathematics is designed to meet standards that address the first three years of a student's high school career. This standard is intended to address a student's career and college readiness in a 4th year course such as Precalculus.
HSG-GPE.B Use coordinates to prove simple geometric theorems algebraically	
HSG-GPE.B.4 Use coordinates to prove simple geometric theorems algebraically. Example: For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).	**Mathematics I** **SE:** 408-414 **TE:** 408A-414B **Mathematics II** **SE:** 543-549 **TE:** 543A-549B **Mathematics III** **SE:** 481-487 **TE:** 481A-487B
HSG-GPE.B.5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	**Mathematics I** **SE:** 306-312 **TE:** 306A-312B **Mathematics III** **SE:** 466-472 **TE:** 466A-472B
HSG-GPE.B.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	**Mathematics III** **SE/TE:** 488-490
HSG-GPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	**Mathematics I** **SE:** 408-414 **TE:** 408A-414B **Mathematics II** **SE:** 535-541 **TE:** 535A-541B **Mathematics III** **SE:** 473-479 **TE:** 473A-479B

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HSG-GMD Geometric Measurement and Dimension	
HSG-GMD.A Explain volume formulas and use them to solve problems	
HSG-GMD.A.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.	**Mathematics II** **SE:** 569-577 **TE:** 569A-577B **Mathematics III** **SE:** 511-518, 557-562, 563-570, 572-578 **TE:** 511A-518B, 557A-562B, 563A-570B, 572A-578B
HSG-GMD.A.2(+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	**Mathematics III** **SE:** 579-584 **TE:** 579A-584B
HSG-GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	**Mathematics III** **SE:** 557-562, 563-570, 572-578, 579-584 **TE:** 557A-562B, 563A-570B, 572A-578B, 579A-584B
HSG-GMD.B Visualize relationships between two-dimensional and three-dimensional objects	
HSG-GMD.B.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	**Mathematics III** **SE:** 557-562 **TE:** 557A-562B
HSG-MG Modeling with Geometry	
HSG-MG.A Apply geometric concepts in modeling situations	
HSG-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	**Mathematics I** **SE/TE:** 218, 227, 232-233, 238-241, 249, 271, 284, 290-291, 294-295, 298, 302, 305, 312, 313 **TE:** 236B, 249A-249B, 313A-313B **Mathematics II** **SE/TE:** 541, 546, 549, 555, 559, 562, 568, 573, 576, 584 **TE:** 555B, 585A-585B **Mathematics III** **SE/TE:** 459, 462, 465, 472, 487, 489-490, 496, 562, 564-567, 570 **TE:** 466B, 472B, 571A-571B

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HSG-MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	**Mathematics I** **SE/TE:** 119, 284, 411 **Mathematics II** **SE/TE:** 4, 624, 628, 639 **Mathematics III** **SE/TE:** 566, 570, 581
HSG-MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	**Mathematics I** **SE/TE:** 218, 284, 298, 302, 318, 362, 374, 379, 380, 395 **TE:** 236B, 380A-380B **Mathematics II** **SE/TE:** 4, 26, 69, 70, 81, 109, 147, 182, 296, 365 **TE:** 26A-26B, 40B, 62B, 204B, 357A **Mathematics III** **SE/TE:** 52, 60, 75, 143, 168, 180, 354, 359, 363, 510 **TE:** 99B, 192B, 296, 363A
Statistics and Probability	
HSS-ID Interpreting Categorical and Quantitative Data	
HSS-ID.A Summarize, represent, and interpret data on a single count or measurement variable	
HSS-ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).	**Mathematics I** **SE/TE:** 431-437, 438-445, 446-452 **TE:** 431A-437B, 438A-445B, 446A-452B **Mathematics III** **SE/TE:** 394-395, 398-399, 408-414 **TE:** 399B, 407B, 414B, 415B
HSS-ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	**Mathematics I** **SE:** 438-445, 446-452, 453-460 **TE:** 438A-445B, 446A-452B, 453A-460B **Mathematics III** **SE/TE:** 407-414 **TE:** 407A-414B

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HSS-ID.A.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	**Mathematics I** **SE:** 438-445, 446-452, 453-460 **TE:** 438A-445B, 446A-452B, 453A-460B, 467B **Mathematics III** **SE:** 407-414 **TE:** 407A-414B
HSS-ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	**Mathematics I** **SE/TE:** 450, 453-460 **TE:** 453A-460B **Mathematics III** **SE:** 415-422 **TE:** 415A-422B
HSS-ID.B Summarize, represent, and interpret data on two categorical and quantitative variables	
HSS-ID.B.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	**Mathematics I** **SE:** 461-466 **TE:** 461A-466B **Mathematics II** **SE:** 477-482 **TE:** 477A-482B
HSS-ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.	**Mathematics I** **SE:** 112-119, 120-128 **TE:** 112A-119B, 120A-128B **Mathematics II** **SE/TE:** 22, 132-139 **TE:** 132A-139B **Mathematics III** **SE/TE:** 235-242, 243-245, 246, 247-253 **TE:** 235A-242B, 246A-246B, 247A-253B

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HSS-ID.B.6a 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.	**Mathematics I** **SE:** 112-119, 120-128 **TE:** 112A-119B, 120A-128B **Mathematics II** **SE/TE:** 22, 132-139 **TE:** 132A-139B **Mathematics III** **SE/TE:** 235-242, 243-245, 246, 247-253 **TE:** 235A-242B, 246A-246B, 247A-253B
HSS-ID.B.6b Informally assess the fit of a function by plotting and analyzing residuals.	**Mathematics I** **SE:** 120-128 **TE:** 120A-128B **Mathematics III** **SE/TE:** 235-242, 243-245, 246 **TE:** 235A-242B, 246A-246B
HSS-ID.B.6c Fit a linear function for a scatter plot that suggests a linear association.	**Mathematics I** **SE:** 112-119, 120-128 **TE:** 112A-119B, 120A-128B **Mathematics II** **SE/TE:** 22, 132-139 **TE:** 132A-139B
HSS-ID.C Interpret linear models	
HSS-ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	**Mathematics I** **SE:** 112-119, 120-128 **TE:** 112A-119B, 120A-128B
HSS-ID.C.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.	**Mathematics I** **SE:** 112-119, 120-128 **TE:** 112A-119B, 120A-128B **Mathematics II** **SE/TE:** 22, 132-139 **TE:** 132A-139B

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HSS-ID.C.9 Distinguish between correlation and causation.	**Mathematics I** **SE:** 112-119, 120-128 **TE:** 112A-119B, 120A-128B **Mathematics II** **SE/TE:** 138 **TE:** 17B **Mathematics III** **SE/TE:** 253 **TE:** 257
HSS-IC Making Inferences and Justifying Conclusions	
HSS-IC.A Understand and evaluate random processes underlying statistical experiments	
HSS-IC.A.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	**Mathematics I** **SE/TE:** 432-433, 440-441, 447-448, 463 **TE:** 453B **Mathematics III** **SE:** 393-399, 400-406 **TE:** 393A-399B, 400A-406B
HSS-IC.A.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. Example: For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?	**Mathematics II** **SE/TE:** 476 **TE:** 483A **Mathematics III** **SE:** 393-399, 400-406 **TE:** 393A-399B, 400A-406B
HSS-IC.B Make inferences and justify conclusions from sample surveys, experiments, and observational studies	
HSS-IC.B.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	**Mathematics I** **SE/TE:** 125, 248, 430, 461-466 **TE:** 127, 461A-461B **Mathematics III** **SE:** 400-406 **TE:** 400A-406B

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HSS-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.	**Mathematics I** **SE/TE:** 430, 446-452, 453-460 **TE:** 446A-452B, 453A-460B **Mathematics III** **SE:** 407-414, 415-422, 423-430 **TE:** 407A-414B, 415A-422B, 423A-430B
HSS-IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	**Mathematics III** **SE:** 431-438 **TE:** 431A-438B
HSS-IC.B.6 Evaluate reports based on data.	**Mathematics III** **SE:** 431-438 **TE:** 431A-438B
HSS-CP Conditional Probability and the Rules of Probability	
HSS-CP.A Understand independence and conditional probability and use them to interpret data	
HSS-CP.A.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").	**Mathematics II** **SE:** 483-490 **TE:** 483A-490B
HSS-CP.A.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.	**Mathematics II** **SE:** 483-490 **TE:** 483A-490B
HSS-CP.A.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*.	**Mathematics II** **SE:** 491-497 **TE:** 491A-497B

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HSS-CP.A.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. Example: 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.	**Mathematics I** **SE:** 461-466 **TE:** 461A-466B **Mathematics II** **SE:** 477-482, 483-490, 491-497 **TE:** 477A-482B, 483A-490B, 491A-497B
HSS-CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. Example: 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.	**Mathematics II** **SE:** 483-490, 491-497 **TE:** 483A-490B, 491A-497B
HSS-CP.B Use the rules of probability to compute probabilities of compound events in a uniform probability model	
HSS-CP.B.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.	**Mathematics II** **SE:** 491-497 **TE:** 491A-497B
HSS-CP.B.7 Apply the Addition Rule, (*A* or *B*) = (*A*) + (*B*) – (*A* and *B*), and interpret the answer in terms of the model.	**Mathematics II** **SE:** 483-490 **TE:** 483A-490B
HSS-CP.B.8(+) Apply the general Multiplication Rule in a uniform probability model, (*A* and *B*) = (*A*)(*B* | *A*) = *P*(*B*)*P*(*A* | *B*), and interpret the answer in terms of the model.	**Mathematics II** **SE:** 483-490 **TE:** 483A-490B

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HSS-CP.B.9 Use permutations and combinations to compute probabilities of compound events and solve problems.	**Mathematics II** **SE:** 499-505 **TE:** 499A-505B
HSS-MD Using Probability to Make Decisions	
HSS-MD.A Calculate expected values and use them to solve problems	
HSS-MD.A.1(+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	**Mathematics II** **SE:** 506-513 **TE:** 506A-513B
HSS-MD.A.2(+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.	**Mathematics II** **SE:** 514-520 **TE:** 514A-520B
HSS-MD.A.3(+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. Example: For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.	**Mathematics II** **SE:** 506-513, 514-520 **TE:** 506A-513B, 514A-520B
HSS-MD.A.4(+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. Example: For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?	**Mathematics II** **SE:** 506-513, 514-520 **TE:** 506A-513B, 514A-520B

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HSS-MD.B Use probability to evaluate outcomes of decisions	
HSS-MD.B.5(+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.	**Mathematics II** **SE:** 514-520, 521-527 **TE:** 514A-520B, 521A-527B **Mathematics III** **SE:** 440-446 **TE:** 440A-446B
HSS-MD.B.5a Find the expected payoff for a game of chance. Example: For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.	**Mathematics II** **SE:** 514-520, 521-527 **TE:** 514A-520B, 521A-527B **Mathematics III** **SE:** 440-446 **TE:** 440A-446B
HSS-MD.B.5b Evaluate and compare strategies on the basis of expected values. Example: For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.	**Mathematics II** **SE:** 514-520, 521-527 **TE:** 514A-520B, 521A-527B **Mathematics III** **SE:** 440-446 **TE:** 440A-446B
HSS-MD.B.6(+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	**Mathematics II** **SE:** 521-527 **TE:** 521A-527B **Mathematics III** **SE:** 440-446 **TE:** 440A-446B
HSS-MD.B.7(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	**Mathematics II** **SE:** 521-527 **TE:** 521A-527B **Mathematics III** **SE:** 431-438, 440-446 **TE:** 431A-438B, 440A-446B