Guthrie Public Schools – Course Pacing Guide: Algebra II

2019– 2020

Math Practices	**Online Resources**
The Oklahoma Academic Standards for Mathematics are developed around four main content strands, Algebraic Reasoning and Algebra, Number and Operations, Geometry and Measurement, and Data and Probability organize the content standards throughout PK-7 and Pre-Algebra. The standards for Algebra I, Algebra II, and Geometry are fundamentally organized around these strands as well. The process standards are defined as the Mathematical Actions and Processes and are comprised of the skills and abilities students should develop and be engaged in throughout their PK-12 mathematics education. Among these are the ability to problem solve, communicate, and reason about mathematics which will help students be ready for the mathematics expectations of college and the skills desired by many employers. While the process and content standards work in concert to create clear, concise, and rigorous mathematics standards and expectations for Oklahoma students with the aim of helping them be college and career ready, it is not intended that each mathematical action and process will be utilized or developed with each standard. Certainly some standards and objectives can be achieved more readily with particular mathematics actions and processes.	Dan Meyer's Ted Talk about teaching math: https://youtu.be/qocAoN4jNwc Links to his 3-act activities, sorted by standard: https://docs.google.com/spreadsheet/ccc?key=0AjIqyKM9d7ZYdEhtR3BJMmdBWnM2YWxWYVM1UWowTEE#gid=0 Oklahoma Academic Vocabulary: http://sde.ok.gov/sde/building-academic-vocabulary#Math
For more:	**Other online resources**
Elaboration on each practice from the Oklahoma State Education website: http://sde.ok.gov/sde/sites/ok.gov.sde/files/OAS-Math-Final%20Version_3.pdf	www.desmos.com is a free online graphing calculator. Excellent for working with linear equations, scatterplots, and best-fit lines.
PLEASE NOTE: This course is designed for Juniors/ Seniors who need Algebra 2 to graduate. It is assumed that students will take the initiative to refresh Algebra 1 skills.	

1st Nine Weeks: 40 Days

Number concepts/ Algebra 1 Review

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
N.401 Exhibit knowledge of elementary number concepts such as rounding, the ordering of decimals, pattern identification, primes, and greatest common factor N. 402 Write positive powers of 10 by using exponents N. 403 Comprehend the concept of length on the number line and find the distance between two points AF. 401 Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and estimating by using a given average value in place of actual values AF. 402 Perform straightforward word-to-symbol translations A. 401 Evaluate algebraic expressions by substituting integers for unknown quantities A. 402 Add and subtract simple algebraic expressions A. 403 Solve routine first-degree equations A. 405 Match simple inequalities with their graphs on the number line F. 401 Evaluate linear and quadratic functions, expressed in function notation, at integer values N. 501 Order fractions N. 502 Find and use the least common multiple N. 503 Work with numerical factors A. 509 Work with squares and square roots of numbers A. 511 Work with scientific notation A. 512 Work problems involving positive integer exponents	A2.N.1.1 Find the value of i^n for any whole number n A2.N.1.4 Understand and apply the relationship of rational exponents to integer exponents and radicals to solve problems A2.A.1.3 Solve one-variable rational equations and check for extraneous solutions A2.A.2.2 Add, subtract, multiply, divide or simplify polynomial and rational expressions A2.F.1.1 Evaluate a function at a given point in its domain	Supplemental Material	

Geometry and Measurement concepts/ Geometry Review

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
N. 405 Find the distance in the coordinate plane between two points with the same x-coordinate or y-coordinate G. 401 Use properties of parallel lines to find the measure of an angle G. 402 Exhibit knowledge of basic angle properties and special sums of angle measures G. 404 Find the length of the hypotenuse of a right triangle when only very simple computation is involved G. 405 Use geometric formulas when all necessary information is given G. 406 Locate points in the coordinate plane G. 501 Use several angle properties to find an unknown angle measure G. 503 Use symmetry of isosceles triangles to find unknown side lengths or angle measures G. 505-507 Compute the perimeter or area of composite geometric figures, triangles, rectangles, or circles after identifying necessary information when one or more additional simple steps are required. G. 511 Find the midpoint of a line segment	A2.F.1.2 Predict the effects of transformations…algebraically and graphically, using various methods and tools that may include graphing calculators or other appropriate technology	Supplemental Material	

Linear Systems/ Linear Review Note: Systems of linear equalities is Alg1, although it may require review.

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
AF. 403 Relate a graph to a situation described in terms of starting value and an additional amount per unit A. 406 Exhibit knowledge of slope A. 502 Solve real-world problems by using first-degree equations G. 510 Determine the slope of a line from points or a graph A. 514 Determine the slope of a line from an equation AF. 503 Match linear equations with their graphs in the coordinate plane A. 604 Solve systems of two linear equations N. 706 Apply properties of matrices and system of equations as a number system	A2.A.1.8 Represent real-world or mathematical problems using systems of linear equations with a maximum or three variables and solve using various methods that may include substitution, elimination, and graphing (may include graphing calculators or other appropriate technology)	Ch. 1 **not 1.2 and 1.3**	

SECOND NINE WEEKS: 35 Days

Algebra 1 Review Part 2: Solving Equations and Inequalities, Absolute Value, Linear Functions/ Relations

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
N. 404 Understand absolute value in terms of distance AF. 403 Relate a graph to a situation described in terms of a starting value and an additional amount per unit AF. 501 Solve multistep arithmetic problems that involve planning or converting common derived units of measure. AF. 502 Build functions and write expressions, equations, or inequalities with a single variable for common pre-algebra settings A. 503 Solve first-degree inequalities with their graphs on the number line A. 504 Match compound inequalities with their graphs on the number line F.503 Build functions and use quantitative information to identify graphs for relations that are proportional or linear AF. 601 Solve word problems containing several rates, proportions, or percentages. AF. 602 Build functions and write expressions, equations, and inequalities for common algebra settings A. 602 Solve linear inequalities when the method involves reversing the inequality A. 606 Solve absolute value equations A. 701 Solve simple absolute value inequalities	A2.A.1.3 Solve one-variable rational equations and check for extraneous solutions A2.F.1.1 Evaluate a function at a given point in its domain	Supplemental Material	

Matrices Note: start with section solving a system of equations using matrices.

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
N. 505 Add and subtract matrices that have integer entries N. 607 Use relations involving addition, subtraction, and scalar multiplication of vectors and of matrices N. 705 Multiply Matrices N. 706 Apply properties of matrices and system of equations as a number system *Recognize, identify, and apply basic properties of matrices *Recognize and identify inverse, zero, and identity matrices	A2.N.1.3 Use matrices to organize and represent data. Identify the order of a matrix, add and subtract matrices of appropriate dimensions, and multiply a matrix by a scalar to create a new matrix to solve problems **Students should also be able to multiply 2 matrices and use matrices to solve a system of equations with 2 or more variables.**	Ch. 1 1.7 Suppl. Material will be needed	

Parent functions and transformations

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
G. 407 Translate points up, down, left, and right in the coordinate plane. F. 505 Understand the concept of a function as having a well-defined output value at each valid input value F. 507 Interpret statements that use function notation in terms of their context F. 511 Use function notation for simple functions of two variables. AF. 604 Given an equation or function, find an equation or function whose graph is a translation by a specified amount up or down. A. 601 Manipulate expressions and equations (e.g., rewrite to or from standard form) F. 601 Relate a graph to a situation described qualitatively in terms of faster change or slower change AF. 703 Analyze and draw conclusions based on information properties of algebra and/ or functions and information from graphs in the coordinate plane. AF. 706 Given an equation or function, find an equation whose graph is a translation by specified amounts in the horizontal and vertical directions. AF.705 Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$	A2.A.1.1 Represent real-world or mathematical problems using quadratic equations A2.A.1.2 Represent real-world or mathematical problems using exponential equations, such as compound interest, depreciation, and population growth. A2.A.2.3 Recognize that a quadratic function has different equivalent representations. A2.F.1.1 Use algebraic, interval, and set notations to specify the domain and range of functions of various types and evaluate a function at a given point in its domain A2.F.1.2 Recognize the graphs of exponential, radical (square root and cube root only), quadratic, and logarithmic functions. Predict the effects of transformation $(f(x + c),\ f(x) + c,\ f(cx),\ and\ cf(x)$, where *c* is a real number) algebraically and graphically, using various methods and tools that may include graphing calculators or other appropriate technology.	Ch. 1 1.2 1.3 Ch. 2 all Ch. 4 4.7 4.8	

Radical Functions and Rational Exponents

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
A. 510 Work with cube roots of number N. 601 Apply number properties involving prime factorization N. 604 Apply the facts that p is irrational and that the square root of an integer is rational only if that integer is a perfect square N. 605 Apply properties of rational exponents G. 605 Use the distance formula	A2.N.1.4 Understand and apply the relationship of rational exponents to integer exponents and radicals to solve problems A2.A.1.5 Solve square root equations with one variable and check for extraneous solutions A2.A.2.4 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	Ch. 5 **not 5.3**	

THIRD NINE WEEKS: 45 Days

Polynomials and Radical Functions

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
A. 402 Add and subtract simple algebraic expressions A. 404 Multiply two binomials A. 505 Add, subtract, and multiply polynomials A. 510 Work with cubes of numbers F. 501 Evaluate polynomial functions, expressed in function notation, at integer values F. 506 Understand the concept of domain and range in terms of valid input and output, and in terms of function graphs F. 508 Find the domain of polynomial and rational functions F. 509 Find the range of polynomial functions F. 604 Evaluate composite functions at integer values G. 607 Find the coordinates of a point reflected across a vertical, horizontal, or linear identity function A. 703 Apply the remainder theorem for polynomials, that *P(a)* is the remainder when *P(x)* is divided by *(x-a)* F. 708 Write an expression for the composite of two simple functions	A2.A.2.2 Add, subtract, multiple, divide, and simplify polynomial and rational expressions A2.F.1.1 Use algebraic, interval, and set notations to specify the domain and range of functions of various types and evaluate a function at a given point in its domain. A2.F.2.1 Add, subtract, multiple and divide functions using function notation and recognize domain restrictions A2.F.1.5 Analyze the graph of a polynomial function by identifying the domain, range, intercepts, zeros, relative maxima, relative minima, and intervals of increase and decrease. A2.F.1.7 Graph a radical function (square root and cube root only) and identify the x- and y-intercepts using various methods and tools that may include a graphing calculator or other appropriate technology. A2.A.1.4 Solve polynomial equations with real roots using various methods and tools that may include factoring, polynomial division, synthetic division, graphing calculators or other appropriate technology. A2.A.2.1 Factor polynomial expressions including but not limited to trinomials, differences of squares, sum and difference of cubes, and factoring by grouping using a variety of tools and strategies. A2.F.1.2 Recognize the graphs radical (square root and cube root only). Predict the effects of transformation ($f(x+c)$, $f(x)+c$, $f(cx)$, and $cf(x)$, where *c* is a real number) algebraically and graphically, using various methods and tools that may include graphing calculators or other appropriate technology. A2.F.2.2 Combine functions by compositions and recognize that $g(x) = f^{-1}(x)$, the inverse of $f(x)$, if and only if $f(g(x)) = g(f(x)) = x$ A2.F.2.3 Find and graph the inverse of a function, if it exists, in real-world and mathematical situations. Know that the domain of a function *f* is the range of the inverse function f^{-1}, and vice versa.	Ch. 4 Ch. 5 5.3	

Quadratic Functions and Equations

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
F. 401 Evaluate quadratic functions, expressed in function notation, at integer values N. 504 Exhibit some knowledge of the complex numbers A. 506 Identify solutions to simple quadratic equations A. 507 Solve quadratic equations in the form$(x + a)(x + b) = 0$, where *a* and *b* are numbers or variables. A. 508 Factor simple quadratics A. 605 Solve quadratic equations N. 704 Apply properties of complex numbers and the complex number system A. 702 match simple quadratic inequalities with their graphs on the number line or coordinate plane	A2.A.1.1 Represent real-world or mathematical problems using quadratic equations and solve using various methods (including graphing technology), factoring, completing the square, and the quadratic formula. Find non-real roots when they exist. A2.A.2.3 Recognize that a quadratic function has different equivalent representation [$f(x) = ax^2 + bx + c, f(x) = a(x - h)^2 + k, and\ f(x) = (x - s_1)(x - s_2)$. Identify and use the representation that is most appropriate to solve real-world and mathematical problems. A2.F.1.1 Use algebraic, interval, and set notations to specify the domain and range of functions of various types and evaluate a function at a given point in its domain. A2.F.1.3 Graph a quadratic function. Identify the x- and y-intercepts, maximum or minimum value, axis of symmetry, and vertex using various methods and tools.	Ch. 3	

Chapter 6: Exponential and Logarithmic Functions

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
AF. 701 Solve complex arithmetic problems involving percent of increase or decrease or requiring integration of several concepts F. 702 Build functions for relations that are exponential	A2.A.1.2 Represent real-world or mathematical problems using exponential equations, such as compound interest, depreciation, and population growth and solve these equations graphically or algebraically A2.A.1.6 Solve common and natural logarithmic equations using the properties of logarithms A2.F.1.1 Use algebraic, interval, and set notations to specify the domain and range of functions of various types and evaluate a function at a given point in its domain. A2.F.1.4 Graph exponential and logarithmic functions. Identify asymptotes and x- and y-intercepts using various methods and tools. Recognize exponential decay and growth graphically and algebraically. A2.F.1.8 Graph piecewise functions with no more than three branches (including linear, quadratic, or exponential branches) and analyze the function by identifying the domain, range, intercepts, and intervals for which it is increasing, decreasing, and constant. A2.F.2.4 Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another	Ch. 6	

FOURTH NINE WEEKS: 40 Days

Rational Functions

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
A. 513 Determine when an expression is undefined F. 510 Find where a rational function's graph has a vertical asymptote	A2.A.1.3 Solve one-variable rational equations and check for extraneous solutions A2.F.1.1 Use algebraic, interval, and set notations to specify the domain and range of functions of various types and evaluate a function at a given point in its domain. A2.F.1.6 Graph a rational function and identify the x- and y-intercepts, vertical and horizontal asymptotes, using various methods (excluding slant or oblique asymptotes and holes)	Ch. 7	

Sequences and Series

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
F. 502 Find the next term in a sequence described recursively F. 603 Find a recursive expression for the general term in a sequence described reclusively F. 703 Exhibit knowledge of geometric sequences	A2.A.1.7 Solve real-world and mathematical problems that can be modeled using arithmetic or finite geometric sequences or series given the n^{th} terms and sum formulas. Graphing calculators or other appropriate technology may be used.	Ch. 8	

Conics Note: Emphasis should be placed on recognizing characteristics of circles, parabolas, and ellipses that determine shape of the graph, using geometric relationships and on transformation rules.

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
G. 512 Find the coordinates of a point rotated 180° around a given center point A. 601 Manipulate equations (e.g., convert to or from standard form) G. 609 Recognize special characteristics of parabolas and circles AF. 703 Analyze and draw conclusions based on information from graphs in the coordinate plane G. 701 Use relationships among angles, arcs, and distances in a circle	A2.A.1.9 Solve system of equations containing one linear equation and one quadratic equation using tools that may include graphing calculators or other appropriate technology	Suppl. Material	

Probability and Statistics

Standards		Text	Days
Mathematics College & Career Readiness Standards (ACT)	Oklahoma Academic Standards		
S. 401 Calculate the missing data value given the average and all data values by one S. 402 Translate from one representation of data to another (e.g., bar graph to a circle graph; scatterplot to polynomial) S. 403 Determine the probability of a simple event S. 404 Describe events as combinations of other events (e.g., using *and*, *or*, and *not*) S.405 Exhibit knowledge of simple counting techniques F. 504 Attend to the difference between a function modeling a situation and the reality of the situation S. 501 Calculate the average given the frequency counts of all the data values S. 502 Manipulate data from tables and charts S. 503 Compute straightforward probabilities for common situations S. 504 Use Venn diagrams in counting S. 505 recognize that when data summaries are reported in the real world, results are often rounded and must be interpreted as having appropriate precision S. 506 Recognize that when a statistical model is used, model values typically differ from actual values F. 701 Compare actual values and the values of a modeling function to judge model fit and compare models. S. 701 Distinguish between mean, median, and mode for a list of numbers S. 702 Analyze and draw conclusions based on information from tables and charts, including two-way frequency tables S. 703 Understand the role of randomization in surveys, experiments, and observational studies S. 704 Exhibit knowledge of conditional and joint probability	A2.D.1.1 Use the mean and standard deviation of a data set to fit it to a normal distribution (bell-shaped curve) A2.D.1.2 Collect data and use scatterplots to analyze patterns and describe linear, exponential or quadratic relationships between two variables. Using graphing calculators or other appropriate technology, determine regression equation and correlation coefficients; use regression equations to make predictions and correlation coefficients to assess the reliability of those predictions A2.D.1.3 Based upon a real-world context, recognize whether a discrete or continuous graphical representation is appropriate and then create the graph A2.D.2.1 Evaluate reports based on data published in the media by identifying the source of the data, the design of the study, and the way the data are analyzed and displayed. Given spreadsheets, tables, or graphs, recognize and analyze distortions in data displays. Show how graphs and data can be distorted to support different points of view. A2.D.2.2 Identify and explain misleading uses of data. Recognize when arguments based on data confuse correlation and causation.	Ch. 9	