

ALGEBRA 2

Numbers and Operations Standard: 1 Understands and applies concepts of numbers and operations				
Power Benchmark 1: Understands numbers, ways of representing numbers, relationships among numbers, and number systems				
Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Explores matrices</u>	<ul style="list-style-type: none"> • Matrix • Dimensions • Scalar multiplication 	<ul style="list-style-type: none"> • Knows what operation properties hold for operations with matrices 	<ul style="list-style-type: none"> • Determines what operation properties hold for matrix addition and multiplication • Calculates sum, differences, products of matrices, and scalar products • Represents mathematical and real world data in a matrix 	
b. <u>Uses the properties of roots and exponents in computations</u> ITED**	<ul style="list-style-type: none"> • Root • Square root • Principal square root • Cube root • Exponent • Base • Squaring • Power • Radical • Radicand • Index • Conjugate • Rationalize denominator • Exact form • Approximate form 	<ul style="list-style-type: none"> • Knows squaring is the product of a whole number multiplied by itself • Knows squaring and square root are inverse operations • Knows an exponent tells how many times a base is used as a factor • Knows the rules for multiplying and dividing numbers with exponents • Knows the rules for raising a number with an exponent to a power 	<ul style="list-style-type: none"> • Finds the root of any number • Simplifies expressions containing exponents (ITED) • Writes radicals in simplest form (ITED, ACT, SAT) • Express radicals in exact form and approximate form 	

** 3-5 Questions on ITED

Numbers and Operations Standard: 1 Understands and applies concepts of numbers and operations				
Power Benchmark 1: Understands numbers, ways of representing numbers, relationships among numbers, and number systems (con't)				
Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
c. <u>Explores sequences and series</u>	<ul style="list-style-type: none"> • Infinite sequence • Finite sequence • Recursive formula • Summation • Arithmetic sequence • Geometric sequence • Arithmetic means • Geometric means • Common difference 	<ul style="list-style-type: none"> • Knows basic operations 	<ul style="list-style-type: none"> • Evaluates the first n terms of a arithmetic and geometric sequence • Evaluates the sum for and arithmetic and geometric series • Evaluates the arithmetic and geometric means - 	

Numbers and Operations Standard: 1 Understands and applies concepts of numbers and operations				
Power Benchmark 3: Computes fluently and makes reasonable estimates				
Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Uses a variety of operations on expressions containing complex numbers -</u> ITED *** ACT, SAT	<ul style="list-style-type: none"> • Simplify • Complex number • Imaginary number 	<ul style="list-style-type: none"> • Knows how to add, subtract, multiply, divide, and simplify binomial expressions 	<ul style="list-style-type: none"> • Adds, subtracts, multiplies, divides, and simplifies expressions with complex numbers (ITED, ACT, SAT) 	

*** More than 5 questions on ITED

Algebra Standard: 2 Understands and applies concepts of algebra and functions				
Power Benchmark 1: Understands patterns, relations and functions				
Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Describes functions and their properties using function notation - ITED*</u>	<ul style="list-style-type: none"> • Relation • Function • Domain • Range • One-to-one correspondence • Function notation • Vertical line test • Composite function • Inverse • Horizontal line test • Domain restrictions • Independent variable • Dependent variable 	<ul style="list-style-type: none"> • Knows for every value in the domain of a function, there is one and only one corresponding value in the range • Understands the concept of a function as the correspondence between the elements of two sets • Understands the definition of a function: domain, range, function, relation 	<ul style="list-style-type: none"> • Identifies the domain, range, and rule of a function • Describes functions and their properties using function notation • Recognizes the graphs of non-linear functions (ITED) • Describes from a graph the relationship between two variables (ITED) • Performs operations with functions to write new functions • Finds the composition of two functions • Finds the inverse of a relation or function • Determines whether the inverse of a relation is a function 	

* 1-2 questions on ITED

Algebra Standard: 2 Understands and applies concepts of algebra and functions				
Power Benchmark 1: Understands patterns, relations and functions (con't)				
Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
b. <u>Explores the properties of different classes of functions</u> ITED**	<ul style="list-style-type: none"> • Quadratic function • Polynomial function • Exponential function • Logarithmic function • Common Logarithms • Natural Logarithms • Rational function • Radical function • Absolute value function • Piecewise function • Step function • Zeros/ Root • Asymptotes • End behavior • Local maximum and minimum • Continuity • Increasing & decreasing functions • Growth & decay • Multiplier 	<ul style="list-style-type: none"> • Knows the same function can be represented in a variety of forms • Knows the limitations of non-linear functions • Understands the concept of a class of functions 	<ul style="list-style-type: none"> • Identifies functions expressed numerically or algebraically as linear or non-linear (ITED) • Recognizes properties of families of functions (ITED) • Compares properties of various functions to find common characteristics • Analyzes functions of one variable by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior - 	

** 3-5 questions on ITED

Algebra Standard: 2 Understands and applies concepts of algebra and functions

Power Benchmark 2: Represents and analyzes mathematical situations and structures using algebraic symbols

Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Rewrites algebraic expressions in equivalent forms</u> - ITED*** ACT SAT ASVAB	<ul style="list-style-type: none">• Variable• Algebraic equation• Like terms• Coefficient• Terms• Equivalent forms• Solution• Properties of Equality	<ul style="list-style-type: none">• Recognizes like terms• Knows rules to simplify expressions• Knows the order of operations• Understands the concept of equivalent forms of expressions	<ul style="list-style-type: none">• Simplifies and evaluates algebraic expressions (ITED)• Translates words into algebraic expressions (ITED, ACT, ASVAB)	

*** More than 5 questions on ITED

Algebra Standard: 2 Understands and applies concepts of algebra and functions

Power Benchmark 2: Represents and analyzes mathematical situations and structures using algebraic symbols (con't)

Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
<p>b. <u>Interprets and manipulates polynomial expressions</u> ACT SAT ASVAB</p>	<ul style="list-style-type: none"> • Monomial • Binomial • Trinomial • Polynomial • Common monomial factor • Factoring • Perfect square trinomial • Coefficient • Difference of squares • Sum & difference of two cubes • Synthetic division • Degree • Constant • Linear • Quadratic • Quintic • Cubic • Quartic • Multiplicity • Horizontal Asymptote • Vertical Asymptote • Hole 	<ul style="list-style-type: none"> • Knows the various methods to factor polynomial expressions • Knows the properties of combining polynomials: addition, subtraction, multiplication and division • Knows the terminology to classify polynomials by number of terms and by degree 	<ul style="list-style-type: none"> • Identifies, evaluates, adds, subtracts, multiplies and divides monomials and polynomials • Classifies polynomials and describes the shape of their graphs • Identifies and describes the important features of the graph of a polynomial function • Applies basic factoring techniques to 2nd, 3rd, and 4th degree polynomials • Simplifies fractions with polynomials in the numerator and denominator • Uses the Remainder and Factor Theorems to solve problems • Solves rational equations • Solves rational equations 	

Algebra Standard: 2 Understands and applies concepts of algebra and functions				
Power Benchmark 3: Uses mathematical models to represent and understand quantitative relationships				
Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Uses a variety of methods to solve quadratic equations</u>	<ul style="list-style-type: none"> • Quadratic equation • Parabola • Factoring • Zero product property • Completing the square • General form • Quadratic formula • Roots • Discriminant • Vertex form • Axis of symmetry 	<ul style="list-style-type: none"> • Knows the strengths and limitations of each method • Understands the roots of a quadratic equation are given by the quadratic formula • Knows the quadratic formula gives exact values • Knows the discriminant can provide information about the roots of a quadratic equation 	<ul style="list-style-type: none"> • Analyzes problem situations to decide which method of solving quadratic equations is appropriate • Solves quadratic equations by taking square roots, graphing, factoring, completing the square, and using the quadratic formula 	

Algebra Standard: 2 Understands and applies concepts of algebra and functions

Power Benchmark 3: Uses mathematical models to represent and understand quantitative relationships (con't)

Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
<p>b. <u>Uses a variety of methods to graph linear equations and inequalities</u></p>	<ul style="list-style-type: none"> • Linear equation • Inequality • Slope • X-intercept • Y-intercept • Standard form • Slope-Intercept form • Dependent variable • Independent variable • Parallel and Perpendicular • Scatter plot • Correlation coefficient • Literal equation • Absolute Value 	<ul style="list-style-type: none"> • Knows how the slope and y-intercept of a graph are related to the equation • Knows the algebraic significance of the parts of a graph • Understands properties of graphs and relationships between a graph and its corresponding expression • Knows how to find the slope • Knows how to find the y-intercept • Knows how to solve a proportion 	<ul style="list-style-type: none"> • Graphs an inequality • Formulates a linear equation and inequality from its graph 	
<p>c. <u>Solves equations and inequalities</u></p>	<ul style="list-style-type: none"> • Literal equations • Absolute value equations • Absolute value inequalities 	<ul style="list-style-type: none"> • Knows inequality symbols • Knows definition of absolute value 	<ul style="list-style-type: none"> • Writes an equation for a line parallel or perpendicular to a given line • Solves literal equation • Solves compound inequality • Solves absolute value equations and inequalities 	

Algebra Standard: 2 Understands and applies concepts of algebra and functions

Power Benchmark 3: Uses mathematical models to represent and understand quantitative relationships (cont')

Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
<p>d. <u>Uses a variety of methods to solve systems of equations and inequalities</u></p>	<ul style="list-style-type: none"> • System of equations • Consistent • Inconsistent • Independent and Dependent systems • Substitution method • Elimination method • Graphing method • Linear programming • Constraints • Feasible region • Objective function • Corner-Point Principle 	<ul style="list-style-type: none"> • Knows the strengths and limitations of each method • Knows whether a system of equations has one solution, no solutions, or infinitely many solutions 	<ul style="list-style-type: none"> • Uses a graph to find a solution of a system of equations - • Uses substitution to solve a system of equations - • Uses elimination to solve a system of equations - • Uses matrices to solve a system of equations in mathematical and real world situations - • Solves a system of linear inequalities by graphing - • Writes a system of linear inequalities to solve real world problems - • Writes and graphs a set of constraints for a linear programming problem - • Uses linear programming to find the maximum or minimum value of an objective function - 	

Algebra Standard: 2 Understands and applies concepts of algebra and functions

Power Benchmark 4: Analyzes change in a variety of situations

Course Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Uses a variety of representations to analyze change</u> ITED*	<ul style="list-style-type: none">• Growth rate• Rate of decay	<ul style="list-style-type: none">• Understands change can be described mathematically• Understands how rates of change can be described numerically and graphically• Knows that lines have a constant rate of change	<ul style="list-style-type: none">• Represents constant rates as the slope of a linear graph -• Interprets slope as delta y over delta x -• Expresses rate of change graphically -• Predicts rate of change from numerical and graphical data (ITED)	

* 1-2 questions on ITED

Geometry: 3 Understands and applies concepts of geometry

Power Benchmark 1: Analyzes characteristics and properties of two-and three-dimensional geometric shapes and develops mathematical arguments about geometric relationships

Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Graphs and identifies the critical parts of three conic sections</u>	<ul style="list-style-type: none"> • Circle • Ellipse • Parabola • Foci • Radius • Eccentricity • Major and minor axes • Vertices • Asymptotes • Axis of symmetry • Directrix • Distance formula • Midpoint formula 	<ul style="list-style-type: none"> • Uses the distance and midpoint formulas • Completes the square 	<ul style="list-style-type: none"> • Identifies each conic section from an equation - • Writes each conic section in standard form - • Computes the distance - • Computes the midpoint - • Finds the center and radius - • Finds the vertex, focus and directrix - • Graphs each conic section and identifies the parts - 	

Data Analysis and Probability Standard: 5 Understands and applies concepts of data analysis and probability				
Power Benchmark 1: Formulates questions that can be addressed with data and collects, organizes, and displays relevant data to answer them				
Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Represents data to convey results</u> ITED*	<ul style="list-style-type: none"> • Scatter plot • Correlation • Correlation coefficient • Least-squares line • Regression equation • Linear • Exponential 	<ul style="list-style-type: none"> • Knows the criteria for selecting an appropriate regression equation 	<ul style="list-style-type: none"> • Creates a scatter plot from data - • Draws an informal inference about any correlation between the variables - • Uses a graphing calculator to find the least-squares line and uses it to make predictions - • Find a regression model for the given data - 	
Power Benchmark 2: Selects and uses appropriate statistical methods to analyze data				
Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Evaluates the statistical data using a variety of methods</u>	<ul style="list-style-type: none"> • Sample space • Theoretical probability • Fundamental Counting Principle • Permutations • Combinations • Complement • Independent events • Conditional probability • Mutually exclusive • Factorial 	<ul style="list-style-type: none"> • Knows how to perform operations with fractions • Knows order of operations 	<ul style="list-style-type: none"> • Finds the probability of an event • Finds the permutations of n objects taken r at a time • Finds the permutations with identical objects • Finds circular permutations • Finds the combinations of n objects taken r at a time • Finds the probability of event A or B • Finds the probability of independent, dependent, and conditional events 	

* 1-2 questions on ITED

Problem Solving Standard: 6 Understands and applies problem solving strategies

Power Benchmark 1: Uses a variety of strategies to solve problems

Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. <u>Applies and adapts a variety of appropriate strategies to solve problems</u>	<ul style="list-style-type: none">• Diagram• Table• Equation• Inequality• Patterns• Matrix• Regression• Graph	<ul style="list-style-type: none">• Knows the general problem-solving strategies• Knows the same situation can often be represented in more than one way• Knows different problems may be solved using the same method	<ul style="list-style-type: none">• Chooses appropriate strategies to solve problems in the context of the problem situation (ITED)• Uses previously learned strategies, skills, knowledge, and concepts to solve problems (ITED)• Translates words to numbers and symbolic expressions (ITED)	