

## INTERMEDIATE MATH

<b>Numbers and Operations Standard:</b> Understands and applies concepts of numbers and operations				
<b>Power Benchmark 1:</b> Understands numbers, ways of representing numbers, relationships among numbers, and number systems				
Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. Simplifies expressions involving exponents ACT SAT	<ul style="list-style-type: none"> <li>• Simplify</li> <li>• Exponent</li> <li>• Base</li> <li>• Power</li> <li>• Expanded form</li> <li>• Zero exponent</li> <li>• Negative exponent</li> <li>• Squared</li> <li>• Cubed</li> <li>• Scientific notation</li> </ul>	<ul style="list-style-type: none"> <li>• Knows an exponent tells how many times the base is used as a factor</li> <li>• Knows <math>a^0 = 1</math></li> <li>• Knows <math>a^{-n} = 1/a^n</math></li> <li>• Knows when multiplying exponents with the same base you add the exponents</li> <li>• Knows when dividing exponents with the same base you subtract the exponents</li> </ul>	<ul style="list-style-type: none"> <li>• Simplifies and expands algebraic expressions involving exponents, including zero and negative exponents (ACT, SAT)</li> <li>• Evaluates expressions involving exponents -</li> <li>• Multiplies and divides expressions involving exponents (ITED, ACT, SAT)</li> </ul>	

<b>Numbers and Operations Standard:</b> Understands and applies concepts of numbers and operations				
<b>Power Benchmark 1:</b> Understands numbers, ways of representing numbers, relationships among numbers, and number systems (con't)				
<b>Grade Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
b. Understands properties of real number system and its subsets ITED **	<ul style="list-style-type: none"> <li>• Absolute value</li> <li>• Natural numbers</li> <li>• Whole numbers</li> <li>• Integers</li> <li>• Rational numbers</li> <li>• Irrational numbers</li> <li>• Real numbers</li> <li>• Terminating decimals</li> <li>• Repeating decimals</li> <li>• Opposites</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the relationships among subsets of the real number system</li> </ul>	<ul style="list-style-type: none"> <li>• Represents numbers within each subset (ITED)</li> <li>• Interprets numerical answers on a calculator or computer display -</li> </ul>	
c. Uses the appropriate form of a rational number (fraction, decimal, percent) in computations ITED *** ACT SAT	<ul style="list-style-type: none"> <li>• Rational number</li> <li>• Fraction</li> <li>• Decimal</li> <li>• <del>Percent</del></li> <li>• Equivalent forms</li> </ul>	<ul style="list-style-type: none"> <li>• Understands fractions and decimals, <del>and percents</del> can be expressed in various ways</li> <li>• Knows which rational number is most appropriate based on the context of the problem</li> </ul>	<ul style="list-style-type: none"> <li>• Converts fractions, decimals, and percents to equivalent forms (ITED, ACT)</li> <li>• Identifies the appropriate rational number to use in a problem situation (ITED, ACT)</li> <li>• Compares rational numbers (SAT)</li> </ul>	

<b>Numbers and Operations Standard: 1</b> Understands and applies concepts of numbers and operations				
<b>Power Benchmark 2:</b> Understands meanings of operations and how they relate to one another				
<b>Grade Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
a. Uses the properties of operations to simplify computations and solve problems ACT SAT	<ul style="list-style-type: none"> <li>• Distributive property</li> <li>• Squaring</li> <li>• Square root</li> <li>• Like Terms</li> <li>• Order of operations</li> <li>• Grouping</li> <li>• Inverse operations</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the identity properties of addition and multiplication</li> <li>• Knows the distributive, associative, and communicative properties of addition and multiplication</li> <li>• Knows squaring and square root are inverse operations</li> <li>• Knows the inverse operations undo each other</li> <li>• Recognizes like terms</li> <li>• Understands the rules for combining integers</li> <li>• Knows the order of operations</li> </ul>	<ul style="list-style-type: none"> <li>• Uses inverse properties and relationships to solve problems (ACT, SAT)</li> <li>• Uses order of operation including grouping symbols to solve problems (ITED, ACT, SAT)</li> <li>• Simplifies equations using properties of operations (ACT, SAT)</li> </ul>	

<b>Numbers and Operations Standard: 1</b> Understands and applies concepts of numbers and operations				
<b>Power Benchmark 3:</b> Computes fluently and makes reasonable estimates				
<b>Grade Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
a. Uses estimation strategies for computing real numbers ITED *** ACT SAT	<ul style="list-style-type: none"> <li>• Estimation</li> <li>• Exact answer</li> <li>• Approximate answer</li> <li>• Mental computation</li> <li>• Rounding</li> </ul>	<ul style="list-style-type: none"> <li>• Knows when an estimate or an exact answer is more appropriate</li> <li>• Knows how to judge the reasonableness of an answer</li> <li>• Understands that rounding and estimation inherently add discrepancy</li> <li>• Understands appropriate accuracy when estimating</li> </ul>	<ul style="list-style-type: none"> <li>• Checks answers using estimation strategies (ACT, SAT)</li> <li>• Uses the appropriate places when estimating answers (ITED)</li> <li>• Makes reasonable estimates (ITED)</li> </ul>	

ITED Focus Lessons: Ratios, Proportions, Matrices (adding and subtracting), Fractions, Decimals, Percents, Absolute Value (simplify and solve problems), range of rounded numbers, write equations for specific problem but do not solve

<b>Algebra Standard: 2</b> Understands and applies concepts of algebra and functions				
<b>Power Benchmark 1:</b> Understands patterns, relations and functions				
<b>Course Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
a. Describes functions and their properties using function notation ITED *	<ul style="list-style-type: none"> <li>• Function</li> <li>• Domain</li> <li>• Range</li> <li>• Function notation</li> <li>• Function rule</li> <li>• Relation</li> <li>• Continuous</li> <li>• Linear function</li> <li>• Non-linear function</li> </ul>	<ul style="list-style-type: none"> <li>• Knows for every value in the domain of a function, there is one and only one corresponding value in the range -</li> <li>• Understands the concept of a function as the correspondence between the elements of two sets -</li> <li>• Understands the definition of a function: domain, range, function, relation</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies the domain, range, and rule of a function -</li> <li>• Describes functions and their properties using function notation</li> <li>• Recognizes the graphs of non-linear functions -</li> <li>• Describes from a graph the relationship between two variables (ITED)</li> </ul>	
<b>Power Benchmark 2:</b> Represents and analyzes mathematical situations and structures using algebraic symbols				
a. Represents linear and quadratic functions in a variety of ways ITED *	<ul style="list-style-type: none"> <li>• Standard Form</li> <li>• Quadratic function</li> <li>• Parabola</li> <li>• Vertical Line Test</li> </ul>	<ul style="list-style-type: none"> <li>• Knows a function can be represented in a variety of ways</li> <li>• Understands a family of functions has similar characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Describes functions using words, tables, graphs and equations -</li> <li>• Graphs linear and quadratic functions -</li> <li>• Recognizes a linear and quadratic function from its graph (ITED)</li> <li>• Writes the equation of a linear function given the table of values, graph, two points on the line, and slope and y-intercept -</li> </ul>	

**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	
b. Interprets graphical representations of linear functions and linear inequalities ACT	<ul style="list-style-type: none"> <li>• Rate of change</li> <li>• Slope</li> <li>• Slope-Intercept Form</li> <li>• Undefined slope</li> </ul>	<ul style="list-style-type: none"> <li>• Understands change can be described mathematically</li> <li>• Understands how rate of change can be described numerically and graphically</li> <li>• Knows a linear graph has a constant rate of change</li> </ul>	<ul style="list-style-type: none"> <li>• Interprets slope as the amount of one quantity (y) per unit of another quantity (x) -</li> <li>• Defines slope as a rate of change -</li> <li>• Finds the slope, x-intercept, and y-intercept of a line given its graph, equation, or two points on the line (ACT)</li> <li>• Uses slope to differentiate between lines that are parallel, perpendicular, horizontal, or vertical -</li> <li>• Compares the rates of change of two different graphs -</li> </ul>	
c. Represents direct and inverse variation in equation form ACT ?	<ul style="list-style-type: none"> <li>• Direct Variation</li> <li>• Constant of variation</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	

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

**Power Benchmark 3:** Uses mathematical models to represent and understand quantitative relationships

Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. Rewrites algebraic expression equivalent forms ITED *** ACT SAT ASVAB	<ul style="list-style-type: none"> <li>• Variable</li> <li>• Algebraic expression</li> <li>• Evaluate</li> <li>• Terms</li> <li>• Like terms</li> <li>• Coefficient</li> <li>• Equivalent forms</li> </ul>	<ul style="list-style-type: none"> <li>• Recognizes like terms</li> <li>• Knows rules to simplify expressions</li> <li>• Knows the order of operations</li> <li>• Understands the meaning of equivalent forms of expressions</li> </ul>	<ul style="list-style-type: none"> <li>• Simplifies algebraic expressions by combining like terms and applying appropriate properties (ITED)</li> <li>• Evaluates simple algebraic expressions (ACT, SAT, ASVAB)</li> <li>• Translates words into algebraic expressions (ITED, ACT, ASVAB)</li> </ul>	
b. Simplifies polynomial expressions ACT SAT ASVAB	<ul style="list-style-type: none"> <li>• Polynomial</li> <li>• Standard form</li> <li>• Descending order</li> <li>• Monomial</li> <li>• Binomial</li> <li>• Trinomial</li> <li>• Perfect square trinomial</li> <li>• Constant</li> <li>• Linear</li> <li>• Quadratic</li> <li>• Common monomial factor</li> <li>• Difference of squares</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the rules to simplify polynomials</li> <li>• Knows how to find GCF</li> </ul>	<ul style="list-style-type: none"> <li>• Names polynomials by number of terms -</li> <li>• Writes polynomials in standard form -</li> <li>• Adds, subtracts, and multiplies polynomials (ACT, SAT, ASVAB)</li> <li>• Divides polynomials by monomials -</li> <li>• Factors perfect square trinomials and difference of squares -</li> </ul>	

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

**Power Benchmark 3:** Uses mathematical models to represent and understand quantitative relationships

Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
c. Solves single and multi-step equations ITED *** ACT SAT ASVAB	<ul style="list-style-type: none"> <li>• Single step equations</li> <li>• Multi-step problems</li> <li>• Inverse Operations</li> </ul>	<ul style="list-style-type: none"> <li>• Recognizes like terms</li> <li>• Understands rules for combining terms</li> <li>• Knows the order of operations</li> <li>• Knows the inverse relationship between addition and subtraction and multiplication and division</li> <li>• Understands the process of working backwards to solve equations (strategy of undoing)</li> </ul>	<ul style="list-style-type: none"> <li>• Solves equations for a specified variable (ITED, ACT, SAT, ASVAB)</li> <li>• Solves single and multi-step equations involving like terms on the same side of the equal sign, like terms on both sides of the equal sign, and distributive property (ITED, ACT, SAT, ASVAB)</li> <li>• Writes an equation for specific problem (ITED, SAT, ASVAB)</li> </ul>	
d. Solves single and multi-step inequalities ACT SAT ASVAB	<ul style="list-style-type: none"> <li>• Inequality</li> <li>• Solution of an inequality</li> <li>• Open circle</li> <li>• Solid circle</li> </ul>	<ul style="list-style-type: none"> <li>• Understands the process of working backwards to solve inequalities (strategy of undoing)</li> <li>• Knows the meaning of the inequality symbols</li> <li>• Knows how to represent the inequality symbols on a number line</li> <li>• Knows the solution of an inequality is any number that makes the inequality true, and is usually a set of numbers</li> </ul>	<ul style="list-style-type: none"> <li>• Solves single and multi-step linear inequalities involving like terms on the same side of the inequality symbol, like terms on both sides of the inequality symbol, and distributive property (ACT, SAT, ASVAB)</li> <li>• Graphs solutions of inequalities on a number line -</li> </ul>	

**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)

<b>Grade Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
e. Solves quadratic equations by square roots ACT SAT ASVAB	<ul style="list-style-type: none"><li>• Quadratic equation</li><li>• Square roots</li></ul>	<ul style="list-style-type: none"><li>• Knows how to compute a square root</li></ul>	<ul style="list-style-type: none"><li>• Solves quadratic equations by square roots (ACT, SAT, ASVAB)</li></ul>	

**Geometry Standard: 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.Describes figures by their surfaces	<ul style="list-style-type: none"> <li>• Cylinder</li> <li>• Cone</li> <li>• Sphere</li> <li>• Net</li> <li>• Prism</li> <li>• Pyramid</li> </ul>	<ul style="list-style-type: none"> <li>• Knows concepts of polygons, circles, triangles, and rectangles</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies three-dimensional solids</li> <li>• Identifies and draws nets</li> </ul>	
b.Applies formulas for perimeter, area, and volume to various 2-D and 3-D figures	<ul style="list-style-type: none"> <li>• Perimeter</li> <li>• Circumference</li> <li>• Area</li> <li>• Surface area</li> <li>• Base area</li> <li>• Volume</li> <li>• Altitude</li> <li>• Height</li> <li>• Slant height</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the formulas for perimeter, area, surface area, and volume</li> </ul>	<ul style="list-style-type: none"> <li>• Computes the perimeter, circumference, area, and volume for various figures</li> </ul>	
c. Describes relationships among figures using similarity and congruence	<ul style="list-style-type: none"> <li>• Similar</li> <li>• Corresponding parts</li> <li>• Proportionality</li> <li>• Similar figures</li> <li>• Congruent</li> <li>• Congruent figures</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the properties of similar and congruent figures</li> <li>• Recognizes figures as congruent or similar</li> </ul>	<ul style="list-style-type: none"> <li>• Uses proportionality of similar figures to find lengths of sides</li> <li>• Uses theorems to show congruence of triangles</li> </ul>	
d. Uses properties of Circles to describe relationships between figures	<ul style="list-style-type: none"> <li>• Circle</li> <li>• Diameter</li> <li>• Radius</li> <li>• Arc</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the properties of circles</li> </ul>	<ul style="list-style-type: none"> <li>• Describes relationships of figures using properties of circles</li> </ul>	

	<ul style="list-style-type: none"><li>• Chord</li><li>• Center</li><li>• Semi-circle</li><li>• Inscribed Angle</li></ul>			
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**Geometry Standard: 3** Understands and applies concepts of geometry.

**Power Benchmark 2:** Specifies locations and describes spatial relationships using coordinate geometry and other representational systems.

Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. Finds slope, writes equations, and graphs lines for equations and inequalities	<ul style="list-style-type: none"> <li>• Coordinate grid system</li> <li>• Slope</li> <li>• Y-intercept</li> <li>• Point-slope</li> <li>• Slope-intercept form</li> </ul>	<ul style="list-style-type: none"> <li>• Identifies slopes of lines</li> <li>• Writes equations using slope-intercept form</li> </ul>	<ul style="list-style-type: none"> <li>• Uses distance formula appropriately</li> <li>• Finds slope of a line</li> <li>• Writes equations of lines using slope, intercepts, and points</li> <li>•</li> </ul>	

**Power Benchmark 4:** Uses visualization, spatial reasoning, and geometric modeling to solve problems.

Grade Level Benchmark	Vocabulary	Background Knowledge/Prior Skills	Skills to Assess	
a. Identifies net patterns from 3-D solids	<ul style="list-style-type: none"> <li>• Net</li> </ul>	<ul style="list-style-type: none"> <li>• Faces, edges, cubes, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Draws and recognizes nets from solid shapes</li> </ul>	
b. Identifies geometric measures accurately	<ul style="list-style-type: none"> <li>• Intersection</li> <li>• Points</li> <li>• Plane</li> <li>• Parallel</li> <li>• Perpendicular</li> <li>• Transversal</li> <li>• Corresponding angles</li> <li>• Complementary Angles</li> </ul>	<ul style="list-style-type: none"> <li>• Measures angles accurately</li> </ul>	<ul style="list-style-type: none"> <li>• Finds unknown angles</li> <li>• Names points and intersections accurately</li> <li>• Names pairs of corresponding angles</li> <li>• Names pairs of alternate interior angles</li> </ul>	

	<ul style="list-style-type: none"> <li>• Supplementary Angles</li> <li>• Alternate interior angles</li> </ul>			
c. Describes figures by their characteristics	<ul style="list-style-type: none"> <li>• Polygon</li> <li>• Triangle</li> <li>• Circle</li> <li>• Quadrilateral</li> <li>• Rectangle</li> <li>• Square</li> <li>• Trapezoid</li> <li>• Cone</li> <li>• Cylinder</li> <li>• Prism</li> <li>• Pyramid</li> <li>• Sphere</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the characteristics of figures</li> </ul>	<ul style="list-style-type: none"> <li>• Describes geometric figures using their characteristics</li> <li>• Classifies figures by their discrete characteristics</li> </ul>	
d. Uses properties of triangles to prove and verify relationships	<ul style="list-style-type: none"> <li>• Pythagorean Theorem</li> <li>• Right Triangles</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the Pythagorean Theorem</li> </ul>	<ul style="list-style-type: none"> <li>• Uses the Pythagorean Theorem and its converse to find segment lengths</li> </ul>	

<b>Data Analysis &amp; Probability Standard: 5</b> Understands and applies concepts of data analysis and probability				
<b>Power Benchmark 2:</b> Selects and uses appropriate statistical methods to analyze data				
<b>Grade Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
a. Applies measures of central tendency	<ul style="list-style-type: none"> <li>• Random</li> <li>• Scatter plot</li> <li>• Mean</li> <li>• Median</li> <li>• Mode</li> <li>• Range</li> </ul>	<ul style="list-style-type: none"> <li>• Knows how to find mean, median, mode, and range</li> </ul>	<ul style="list-style-type: none"> <li>• Uses measures of central tendency appropriately</li> <li>• Reads and interprets graphs accurately</li> </ul>	
b. Represents data to convey results	<ul style="list-style-type: none"> <li>• Bar graph</li> <li>• Line graph</li> <li>• Circle graph</li> <li>• Stem-and-leaf plot</li> <li>• Box-and-whisker plot</li> <li>• Frequency table</li> <li>• Histogram</li> <li>• Scatter plot</li> <li>• Misrepresentation</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the basic types of charts, graphs, and tables</li> </ul>	<ul style="list-style-type: none"> <li>• Creates, reads, and draws conclusions from graphical representations</li> </ul>	

<b>Problem Solving Standard: 6</b> Understands and applies problem solving strategies				
<b>Power Benchmark 1:</b> Uses a variety of strategies to solve problems				
<b>Grade Level Benchmark</b>	<b>Vocabulary</b>	<b>Background Knowledge/Prior Skills</b>	<b>Skills to Assess</b>	
a. Applies and adapts a variety of appropriate strategies to solve problems	<ul style="list-style-type: none"> <li>• Guess and check</li> <li>• Eliminate possibilities</li> </ul>	<ul style="list-style-type: none"> <li>• Knows the general problem solving strategies</li> <li>• Knows the same situation</li> </ul>	<ul style="list-style-type: none"> <li>• Chooses appropriate strategies to solve problems in the context of the problem situation (ITED)</li> </ul>	

	<ul style="list-style-type: none"> <li>• Work backwards</li> </ul>	<p>can often be represented in more than one way</p> <ul style="list-style-type: none"> <li>• Knows different problems may be solved using the same method</li> </ul>	<ul style="list-style-type: none"> <li>• Uses previous learned strategies, skills, knowledge, and concepts to solve problems (ITED)</li> <li>• Translates words to numbers to symbolic expressions (ITED)</li> </ul>	
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