LINEAR ALGEBRA APPEALS TEST STUDY GUIDE

The following are the benchmarks from the MCA that are in the Linear Algebra course. The sections from the textbooks are also included. In the last column, you will find topics related to that benchmark. You can use these as search terms if you want to use extra practice websites such as IXL and Kahn Academy.

	MCA Benchmark	Textbook section(s)	Additional topics to search
8.2.3.1	Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables.	1-2	Evaluating algebraic expressions
8.2.3.2	Justify steps in generating equivalent expressions by identifying the properties used, including the properties of algebra. Properties include the associative, commutative and distributive laws, and the order of operations, including grouping symbols.	1-5, 1-6	Algebraic properties
8.1.1.1A	Classify real numbers as rational or irrational.	1-8	Classifying real numbers
8.1.1.1B	Know that when a square root of a positive integer is not an integer, then it is irrational.	1-8	Square roots and irrational numbers
8.1.1.1C	Know that the sum of a rational number and an irrational number is irrational.	1-8	sum of irrational numbers
8.1.1.1D	Know that the product of a non-zero rational number and an irrational number is irrational	1-8	product of irrational numbers
8.1.1.2A	Compare real numbers.	1-8	Compare real numbers
8.1.1.2B	Locate real numbers on a number line.	1-8	real numbers, number line
8.1.1.2C	Identify the square root of a positive integer as an integer	1-8	square roots of integers
8.1.1.2D	If the square root of a positive integer is not an integer, locate it as a real number between two consecutive positive integers.	1-8	Estimating square roots
8.1.1.3	Determine rational approximations for solutions to problems involving real numbers.	1-8	Estimating square roots
8.2.4.2A	Solve multi-step equations in one variable.	2-2, 2-3, 2-4	Solving one-step and multi-step equations
8.2.4.4	Use linear inequalities to represent relationships in various contexts.	6-1, 6-2, 6-3	Writing linear inequalities
8.2.4.5	Solve linear inequalities using properties of inequalities. Graph the solutions on a number line.	6-1, 6-2, 6-3	Solving and graphing inequalities in one variable

8.1.1.4A	Know and apply the properties of positive integer exponents to generate equivalent numerical expressions.	7-1	Exponent rules
8.1.1.4B	Know and apply the properties of negative integer exponents to generate equivalent numerical expressions.	7-2	Exponent rules
8.1.1.5A	Express approximations of very large and very small numbers using scientific notation.	Pre-Algebra Topic	Scientific notation
8.1.1.5B	Understand how calculators display numbers in scientific notation.	Pre-Algebra Topic	Scientific notation
8.1.1.5C	Multiply and divide numbers expressed in scientific notation, express the answer in scientific notation.	Not in textbook	Operations with scientific notation
8.1.1.5D	Use the correct number of significant digits when physical measurements are involved.	Not in textbook	significant digits
8.2.4.2B	Solve for one variable in a multi-variable equation in terms of the other variables.	2-5 and 2-8	Solving multi-step equations
8.2.4.2C	Justify the steps by identifying the properties of equalities used.	2-5 and 2-8	Solving literal equations or solving for a specified variable
8.2.2.1	Represent linear functions with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another.	3-1	Relations
8.2.1.3	Understand that a function is linear if it can be expressed in the form f(x)=mx+b or if its graph is a straight line.	3-2 and 3-3	Linear functions and function notation
8.2.1.1A	Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable.	1-9 and 3-3	Linear functions
8.2.1.1B	Use functional notation, such as $f(x)$, to represent relationships.	3-2	Function notation
8.2.2.2A	Identify graphical properties of linear functions including slopes and intercepts.	3-5	x-intercept and y-intercept
8.2.2.2B	Know that the slope equals the rate of change.	3-5	Rate of change
8.2.2.2C	Know that the y-intercept is zero when the function represents a proportional relationship.	3-5	Proportional vs. Non-proportional relations
8.2.4.1	Use linear equations to represent situations involving a constant rate of change, including proportional and non-proportional relationships.	3-5	Writing linear equations

8.2.1.4	Understand that an arithmetic sequence is a linear function that can be expressed in the form f(x)=mx+b, where x = 0, 1, 2, 3,…	3-5	Arithmetic vs. geometric sequences or progressions
8.2.2.4	Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.	3-5	Representing arithmetic sequences *the form of the equation used on the MCA is y=mx+b, not $a_n=a_1+d(n-1)$
8.2.2.3	Identify how coefficient changes in the equation f(x)=mx+b affect the graphs of linear functions. Know how to use graphing technology to examine these effects.	4-1 and 4-2	Slope, graphing, family of graphs, and parent functions
8.2.1.2	Use linear functions to represent relationships in which changing the input variable by some amount leads to a change in the output variable that is a constant times that amount.	4-1 and 4-2	Slope, graphing, family of graphs, and parent functions
8.2.4.3A	Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms.	4-3, 4-4, and 4-5	Slope-intercept, point-slope and standard forms
8.2.4.3B	Given sufficient information, find an equation of a line.	4-3, 4-4, and 4-5	Writing the equation of a line
8.3.2.1A	Understand and apply the relationships between the slopes of parallel lines.	4-7	Slopes of parallel lines
8.3.2.1B	Understand and apply the relationships between the slopes of perpendicular lines.	4-7	Slopes of perpendicular lines
8.3.2.2	Analyze polygons on a coordinate system by determining the slopes of their sides.	4-7	Analyzing polygons by slope or coordinates
8.3.2.3A	Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel to the given line, symbolically and graphically.	4-7	Writing equations for parallel lines
8.3.2.3B	Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are perpendicular to the given line, symbolically and graphically.	4-7	Writing equations for perpendicular lines
8.2.4.9	Use the relationship between square roots and squares of a number to solve problems.	10-4	Solving radical equations
8.3.1.1	Use the Pythagorean Theorem to solve problems involving right triangles	10-4	Pythagorean theorem

8.3.1.2A	Use the Pythagorean Theorem to find the distance between any two points in a coordinate system.	10-4	Pythagorean theorem
8.3.1.2B	Determine the distance between two points on a horizontal or vertical line in a coordinate system.	10-5	Distance formula
8.3.1.3	Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software.	10-4	Pythagorean theorem
8.4.1.1	Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display scatterplots and corresponding lines of best fit.	4-6	Making a scatter plot
8.4.1.2	Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set.	4-6	Line of fit, interpolation, and extrapolation
8.4.1.3	Assess the reasonableness of predictions using scatterplots by interpreting them in the original context.	4-6	Reasonableness of predictions using scatterplots
8.2.4.7	Represent relationships in various contexts using systems of linear equations. Solve systems of linear equations in two variables symbolically, graphically and numerically.	5-1, 5-2, 5-3, 5-4, 5-5	Solving systems of linear equations in two variables
8.2.4.8	Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations.	5-1	Solving systems of linear equations by graphing and checking solution for system
8.2.4.6	Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve such equations and inequalities and graph the solutions on a number line.	6-4, 6-5, 6-6	Writing and solving absolute value equations and inequalities
8.2.1.5	Understand that a geometric sequence is a non-linear function that can be expressed in the form f(x)=ab^x, where x = 0, 1, 2, 3,...	Not in textbook	Geometric sequences or progressions
8.2.2.5	Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.	Not in textbook	Geometric sequences or progressions