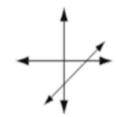
8th Grade MCA3 Standards, Benchmarks, Examples, Test Specifications & Sampler Questions

Strand	Standard	No.	Benchmark (8th Grade)	Sampler Item
Number & Operation **MCA 6-8 Items** **Modified MCA 6-7 Items**	Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts. **MCA 6-8 Items** **Modified MCA 6-7 Items**	8.1.1.1	Classify real numbers as rational or irrational. Know that when a square root of a positive integer is not an integer, then it is irrational. Know that the sum of a rational number and an irrational number is irrational, and the product of a non-zero rational number and an irrational number is irrational. ***(1.6)*** *For example:* Classify the following numbers as whole numbers, integers, rational numbers, irrational numbers, recognizing that some numbers belong in more than one category: $\frac{6}{3}$, $\frac{3}{6}$, $3.\overline{6}$, $\frac{\pi}{2}$, $-\sqrt{4}$, $\sqrt{10}$, -6.7. *Item Specifications* • Allowable notation: $\sqrt{18}$ • Vocabulary allowed in items: irrational, real,square root, radical ***"and vocabulary given at previous grades" (&vgapg.)***	Which expression results in a rational number? **A.** $1.5+\sqrt{1.5}$ **B.** $12-\sqrt{12}$ **C.** $\frac{3}{4}\cdot\sqrt{\frac{3}{4}}$ **D.** $25\div\sqrt{25}$
		8.1.1.2	Compare real numbers; locate real numbers on a number line. Identify the square root of a positive integer as an integer, or if it is not an integer, locate it as a real number between two consecutive positive integers. ***(1.6)*** *For example:* Put the following numbers in order from smallest to largest: 2, $\sqrt{3}$, -4, -6.8, $-\sqrt{37}$. *Another example:* $\sqrt{68}$ is an irrational number between 8 and 9. *Item Specifications* • Allowable notation: $\sqrt{18}$ • Vocabulary allowed in items: square root, radical, consecutive &vgapg.	The number $\sqrt{3}$ is located between 2 consecutive integers. Plot the location of the 2 integers. Click on the number line to plot the points. 
		8.1.1.3	Determine rational approximations for solutions to problems involving real numbers. ***(1.6)*** *For example:* A calculator can be used to determine that $\sqrt{7}$ is approximately 2.65. *Another example:* To check that $1\frac{5}{12}$ is slightly bigger than $\sqrt{2}$, do the calculation $\left(1\frac{5}{12}\right)^2=\left(\frac{17}{12}\right)^2=\frac{289}{144}=2\frac{1}{144}$. *Another example:* Knowing that $\sqrt{10}$ is between 3 and 4, try squaring numbers like 3.5, 3.3, 3.1 to determine that 3.1 is a reasonable rational approx. of $\sqrt{10}$. *Item Specifications* • Allowable notation: $\sqrt{18}$ • Vocabulary allowed in items: square root, radical, consecutive &vgapg. No Example Question on the State Sampler	(none)

Strand	Standard	No.	Benchmark (8th Grade)	Sampler Item
		8.1.1.4	Know and apply the properties of positive and negative integer exponents to generate equivalent numerical expressions. ***(1.6)*** *For example*: $3^2 \times 3^{(-5)} = 3^{(-3)} = \left(\frac{1}{3}\right)^3 = \frac{1}{27}$. *Item Specifications* • Allowable notation: $-x^2$, $(-x)^2$, -3^2, $(-3)^2$ • Expressions may be numeric or algebraic. • Vocabulary allowed in items: vocabulary given at previous grades	Simplify. $(4x)^2 - 4x^3$ A. x^{-1} B. $12x^{-1}$ C. $16x^2 - 4x^3$ D. $16x^2 - 64x^3$ Modified Example Which choice shows how to simplify $y^6 \cdot y^6$? A. y^{6+6} B. $y^{6\times6}$ C. $y^{6\div6}$
		8.1.1.5	Express approximations of very large and very small numbers using scientific notation; understand how calculators display numbers in scientific notation. Multiply and divide numbers expressed in scientific notation, express the answer in scientific notation, using the correct number of significant digits when physical measurements are involved. ***(1.6)*** *For example*: $(4.2\times10^4)\times(8.25\times10^3)=3.465\times10^8$, but if these numbers represent physical measurements, the answer should be expressed as 3.5×10^8 because the first factor, 4.2×10^4, only has two significant digits. *Item Specifications* • Vocabulary allowed in items: scientific notation, significant digits, standard form &vgapg.	Simplify. $\frac{1.2\times10^{-6}}{4.8\times10^4}$ A. 2.5×10^{-2} B. 2.5×10^{-9} C. 2.5×10^{-10} D. 2.5×10^{-11}
Algebra **MCA 24-30 Items** **Modified MCA**	Understand the concept of function in real-world and mathematical situations, and distinguish between linear	8.2.1.1	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. Use functional notation, such as $f(x)$, to represent such relationships. ***(1)*** *For example:* The relationship between the area of a square and the side length can be expressed as $f(x)=x^2$. In this case, $f(5)=25$, which represents the fact that a square of side length 5 units has area 25 units squared. *Item Specifications* • Vocabulary allowed in items: independent,dependent, function, constant, coefficient &vgapg.	Which table of values does **not** represent a function? A. x: -1, 0, 1; y: 0, 0, 2 B. x: -1, 0, 1; y: -2, 0, 2 C. x: -1, 0, 0; y: -2, 0, 2 D. x: -1, 0, 1; y: -1, 0, 1

Strand	Standard	No.	Benchmark (8th Grade)	Sampler Item
14-17 Items	and nonlinear functions. **MCA** **4-5 Items** **Modified MCA** **2-4 Items**	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. ***(1)*** *For example*: Uncle Jim gave Emily \$50 on the day she was born and \$25 on each birthday after that. The function $f(x) = 50 + 25x$ represents the amount of money Jim has given after x years. The rate of change is \$25 per year. *Item Specifications* • Vocabulary allowed in items: independent, dependent, constant, coefficient &vgapg.	The number of cakes needed for a party, c, is dependent upon the number of guests at the party, g. Which equation shows the number of cakes as a function of the number of guests? **A.** $f(c) = \frac{g}{12}$ **B.** $f(g) = \frac{g}{12}$ **C.** $f(c) = \frac{c}{12}$ **D.** $f(g) = \frac{c}{12}$
		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. ***(1)*** *For example*: The function $f(x) = x^2$ is not a linear function because its graph contains the points (1,1), (-1,1) and (0,0), which are not on a straight line. *Item Specifications* • Vocabulary allowed in items: linear, constant, coefficient &vgapg.	Determine if the relationships are linear or nonlinear. **Linear** **Nonlinear** Click and drag each relationship into the boxes. $y = x^2 + 1$ $y = 3x$ x y 3 4 3 5 4 6 5 7 
		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,…. ***(1)*** *For example*: The arithmetic sequence 3, 7, 11, 15, …, can be expressed as $f(x) = 4x + 3$. *Item Specifications* • Vocabulary allowed in items: n^{th} term, arithmetic sequence, geometric sequence, linear function, non-linear function, progression, common difference &vgapg.	Which sequence is arithmetic? **A.** 4 8 16 32 64 .... **B.** 11 12 14 17 21 .... **C.** 28 15 2 −11 −24 .... **D.** 30 −25 20 −15 10 ....

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<tr>
<td rowspan="2"></td>
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<td>8.2.1.5</td>
<td>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,…. (<u>1</u>)
<u>For example:</u> The geometric sequence 6, 12, 24, 48, … , can be expressed in the form $f(x) = 6(2^x)$.
<u>Item Specifications</u>
• Vocabulary allowed in items: n^{th} term, arithmetic sequence, geometric sequence, linear function, non-linear function, exponential, progression, common ratio &vgapg.</td>
<td>Which function forms a geometric sequence when $x = 1, 2, 3, \ldots$?
A. $f(x) = x + 2$
B. $f(x) = x^2$
C. $f(x) = x^2 + 2$
D. $f(x) = 2^x$</td>
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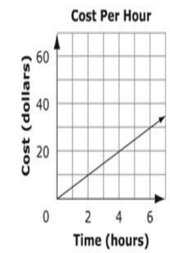
<td>Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

MCA
4-6 Items

Modified MCA
2-4 Items</td>
<td>8.2.2.1</td>
<td>Represent linear functions with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another. (<u>1.2</u>)
<u>Item Specifications</u>
• Vocabulary allowed in items: linear function &vgapg.</td>
<td>A graph is shown.


Which situation is represented by the graph?
A. It costs $2 per hour to rent a bike for 10 hours.
B. It costs $60 to rent a boat for 8 hours.
C. It costs $5 per hour to rent ice skates.
D. It costs $40 to rent a snowboard.

<u>Modified Example</u>
A plumber charges a base fee of $75 plus $50 per hour, h.
The total cost, c, can be represented with the formula shown.
$c = 75 + 50h$ c = cost, h = hours
Which table shows the relationship between hours and cost?
A. Cost for Plumber
<table><tr><th>h</th><th>c</th></tr><tr><td>1</td><td>75</td></tr><tr><td>2</td><td>125</td></tr><tr><td>3</td><td>175</td></tr></table>
B. Cost for Plumber
<table><tr><th>h</th><th>c</th></tr><tr><td>1</td><td>125</td></tr><tr><td>2</td><td>175</td></tr><tr><td>3</td><td>225</td></tr></table>
C. Cost for Plumber
<table><tr><th>h</th><th>c</th></tr><tr><td>1</td><td>125</td></tr><tr><td>2</td><td>250</td></tr><tr><td>3</td><td>375</td></tr></table>
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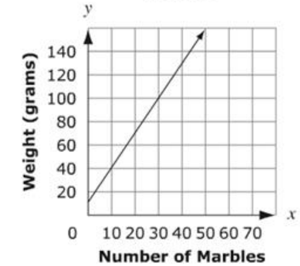
		8.2.2.2	Identify graphical properties of linear functions including slopes and intercepts. Know that the slope equals the rate of change, and that the y-intercept is zero when the function represents a proportional relationship. ***(1.2)*** *Item Specifications* • Coordinates used for determining slope must contain integer values • Vocabulary allowed in items: linear function, intercept &vgapg.	Jayda makes a graph to show the weight of a jar when it contains different numbers of marbles. **Weight of a Jar with Marbles**  What does the y-intercept represent? **A.** The weight of each marble **B.** The weight of the jar by itself **C.** The number of marbles when the weight is 0 grams **D.** The number of marbles when the weight is 10 grams
		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. ***(1.2)*** *Item Specifications* • Vocabulary allowed in items: linear function, intercept, coefficient, constant &vgapg.	An equation is shown. $m = 4p + 3$ When p is increased by 2, how much does m increase? **A.** 2 **B.** 4 **C.** 7 **D.** 8
		8.2.2.4	Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems. ***(1.2)*** *For example*: If a girl starts with \$100 in savings and adds \$10 at the end of each month, she will have $100 + 10x$ dollars after x months. *Item Specifications* • Vocabulary allowed in items: n^{th} term, arithmetic sequence, geometric sequence, linear function, non-linear function, progression &vgapg.	A sequence is shown. −1 −7 −13 −19 −25 …. What is the function rule for the sequence? **A.** $f(x) = x - 6$ **B.** $f(x) = -6x$ **C.** $f(x) = 5x - 6$ **D.** $f(x) = -6x + 5$

Strand	Standard	No.	Benchmark (8th Grade)	Sampler Item
		8.2.2.5	Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems. ***(1.2)*** *For example*: If a girl invests \$100 at 10% annual interest, she will have $100(1.1^x)$ dollars after x years. *Item Specifications* • Vocabulary allowed in items: n^{th} term, arithmetic sequence, geometric sequence, linear function, non-linear function, progression &vgapg.	A sequence is shown. 1.5 4.5 13.5 40.5 …. What is the seventh term in the sequence? **A.** 121.5 **B.** 364.5 **C.** 1,093.5 **D.** 3,280.5
	Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions. **MCA 3-5 Items** **Modified MCA 2-4 Items**	8.2.3.1	Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables. ***(2.5)*** *For example*: Evaluate $\pi r^2 h$ when $r = 3$ and $h = 0.5$, and then use an approximation of π to obtain an approximate answer. *Item Specifications* • Items must not have context • Directives may include: simplify, evaluate • Vocabulary allowed in items: vocabulary given at previous grades	What is the value of $-3\|-2x-y\|$ when $x=-4$ and $y=5$? **A.** −27 **B.** −9 **C.** 9 **D.** 27
		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. ***(2.5)*** *Item Specifications* • Items must not have context • Vocabulary allowed in items: associative, commutative, distributive, identity, property, order of operations, &vgapg.	Which property is used in the equation $mg+mh=m(g+h)$? **A.** Associative **B.** Commutative **C.** Distributive **D.** Identity

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<tr><td rowspan="3"></td><td rowspan="3">Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

MCA
10-15 Items
Modified MCA
7-9 Items</td><td>8.2.4.1</td><td>Use linear equations to represent situations involving a constant rate of change, including proportional and non-proportional relationships. <u>(1.7)</u>
<u>For example</u>: For a cylinder with fixed radius of length 5, the surface area $A = 2\pi(5)h + 2\pi(5)^2 = 10\pi h + 50\pi$, is a linear function of the height h, but the surface area is not proportional to the height.
<u>Item Specifications</u>
• Vocabulary allowed in items: vocabulary given at previous grades</td><td>Leon plants 3 rows of tomatoes with n plants in each row. He also plants 1 row of beans with 5 plants in the row. Which equation can be used to find t, the total number of plants Leon planted?
A. $t = n + 8$
B. $t = 3n + 1$
C. $t = 3n + 5$
D. $t = 5n + 3$
<u>Modified Example</u>
The table shows the number of cars, c, students washed at a car wash and the money, m, they made.<table><tr><th>Number of cars, c</th><th>Money, m</th></tr><tr><td>20</td><td>$30</td></tr><tr><td>30</td><td>$50</td></tr></table>Which equation represents m, the money made in terms of c, the number of cars washed?
A. $m = 2c - 10$
B. $m = -2c - 10$
C. $m = \frac{1}{2}c - 10$</td></tr>
<tr><td>8.2.4.2</td><td>Solve multi-step equations in one variable. Solve for one variable in a multi-variable equation in terms of the other variables. Justify the steps by identifying the properties of equalities used. <u>(1.7)</u>
<u>For example</u>: The equation $10x + 17 = 3x$ can be changed to $7x + 17 = 0$, and then to $7x = -17$ by adding/subtracting the same quantities to both sides. These changes do not change the solution of the equation.
<u>Another example</u>: Using the formula for the perimeter of a rectangle, solve for the base in terms of the height and perimeter.
<u>Item Specifications</u>
• Vocabulary allowed in items: vocabulary given at previous grades</td><td>What is the value of p when $2p + 10 = 24$?
A. $p = 7$
B. $p = 12$
C. $p = 17$
D. $p = 28$</td></tr>
<tr><td>8.2.4.3</td><td>Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms. Given sufficient information, find an equation of a line. <u>(1.7)</u>
<u>For example</u>: Determine an equation of the line through the points (-1,6) and (2/3, -3/4)
<u>Item Specifications</u>
• Vocabulary allowed in items: slope-intercept form, point-slope form, standard form &vgapg.</td><td>Which is the equation of the same line a
$y = 3x - 8$?
A. $3x - 2y = 8$
B. $-3x - 2y = -8$
C. $6x - y = 16$
D. $6x - 2y = 16$</td></tr>
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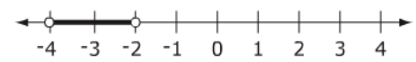
Strand	Standard	No.	Benchmark (8th Grade)	Sampler Item
		8.2.4.4	Use linear inequalities to represent relationships in various contexts. ***(1.7)*** *For example*: A gas station charges $0.10 less per gallon of gasoline if a customer also gets a car wash. Without the car wash, gas costs $2.79 per gallon. The car wash is $8.95. What are the possible amounts (in gallons) of gasoline that you can buy if you also get a car wash and can spend at most $35? *Item Specifications* • Inequalities contain no more than 1 variable • Vocabulary allowed in items: vocabulary given at previous grades	Ann sells bracelets for $4 each and necklaces for $8 each. Which inequality shows x, the number of bracelets, and y, the number of necklaces Ann must sell to make at least $100? **A.** $4x+8y\le 100$ **B.** $4x+8y\ge 100$ **C.** $8x+4y\le 100$ **D.** $8x+4y\ge 100$
		8.2.4.5	Solve linear inequalities using properties of inequalities. Graph the solutions on a number line. ***(1.7)*** *For example*: The inequality $-3x < 6$ is equivalent to $x > -2$, which can be represented on the number line by shading in the interval to the right of -2. *Item Specifications* • Vocabulary allowed in items: vocabulary given at previous grades	A number line is shown.  Which equation has the solution shown on the number line? **A.** $-4>x>-2$ **B.** $4<-2x<8$ **C.** $4>-2x>8$ **D.** $-4<2x<-8$
		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. ***(1.7)*** *For example*: A cylindrical machine part is manufactured with a radius of 2.1 cm, with a tolerance of 1/100 cm. The radius r satisfies the inequality $\|r - 2.1\| \le .01$. *Item Specifications* • Vocabulary allowed in items: vocabulary given at previous grades	An equation is shown. $\|2x-4\|=6$ The equation has 2 solutions. One solution is $x=5$. What is the other solution? Type your answer in the box.
		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. ***(1.7)*** *For example*: Marty's cell phone company charges $15 per month plus $0.04 per minute for each call. Jeannine's company charges $0.25 per minute. Use a system of equations to determine the advantages of each plan based on the number of minutes used. *Item Specifications* • Vocabulary allowed in items: system of equations, undefined, infinite, intersecting, identical &vgapg.	Lisa has 5 more green marbles than blue marbles. She has a total of 40 green and blue marbles. Which system of equations represents this situation if x is the number of green marbles and y is the number of blue marbles? **A.** $\begin{cases} y=x+5 \\ x+y=40 \end{cases}$ **B.** $\begin{cases} x=y+5 \\ x+y=40 \end{cases}$ **C.** $\begin{cases} y=x+5 \\ y=x+40 \end{cases}$ **D.** $\begin{cases} x=y+5 \\ x=y+40 \end{cases}$

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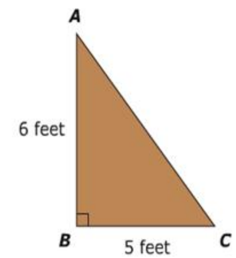
		8.2.4.8	Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations. ***(1.7)*** *Item Specifications* • Assessed within 8.2.4.7 No Example Question on the State Sampler	(none)
		8.2.4.9	Use the relationship between square roots and squares of a number to solve problems. ***(1.7)*** *For example:* If $\pi x^2 = 5$, then $\lvert x \rvert = \sqrt{\frac{5}{\pi}}$, or equivalently, $x = \sqrt{\frac{5}{\pi}}$ or $x = -\sqrt{\frac{5}{\pi}}$. If x is understood as the radius of a circle in this example, then the negative solution should be discarded and $x = \sqrt{\frac{5}{\pi}}$. ***(1.7)*** *Item Specifications* • Allowable notation: ±3 • Items assess the interpretation of square roots based on the context of the item • Vocabulary allowed in items: square root &vgapg. No Example Question on the State Sampler	(none)
Geometry & Measurement **MCA 8-10 Items** **Modified MCA 6-7 Items**	Solve problems involving right triangles using the Pythagorean Theorem and its converse. **MCA 3-5 Items** **Modified MCA 3-4 Items**	8.3.1.1	Use the Pythagorean Theorem to solve problems involving right triangles. ***(1.7)*** *For example:* Determine the perimeter of a right triangle, given the lengths of two of its sides. *Another example*: Show that a triangle with side lengths 4, 5 and 6 is not a right triangle. *Item Specifications* • Congruent angle marks may be used. • Vocabulary allowed in items: Pythagorean Theorem &vgapg.	A triangle is shown.  What is *AC*? Type your answer in the box. feet
		8.3.1.2	Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean Theorem to find the distance between any two points in a coordinate system. ***(1.7)*** *Item Specifications* • Graphs are not provided when finding horizontal or vertical distance • Vocabulary allowed in items: Pythagorean Theorem &vgapg.	What is the distance between (4, 7) and (−3, 9) on a coordinate grid? **A.** $\sqrt{5}$ **B.** $\sqrt{45}$ **C.** $\sqrt{53}$ **D.** $\sqrt{305}$

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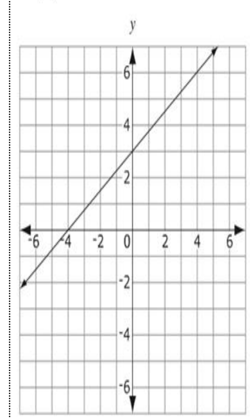
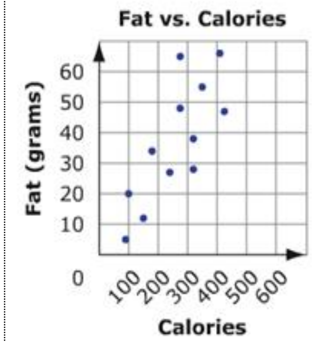
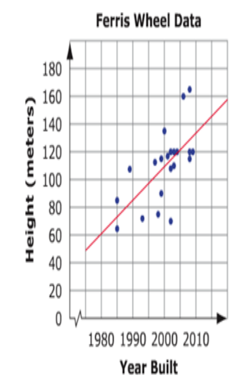
		8.3.1.3	Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software. ***(1.7)*** *Item Specifications* • Not assessed on the MCA-III No Example Question on the State Sampler	(none)
	Solve problems involving parallel and perpendicular lines on a coordinate system. **MCA** **3-5 Items** **Modified MCA** **3-4 Items**	8.3.2.1	Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine these relationships. ***(1.7)*** *Item Specifications* • Vocabulary allowed in items: vocabulary given at previous grades	Which lines are perpendicular to $y=\frac{1}{2}x+3$? Click on the equations you want to select. $y=2x+3$ $2x+y=-1$ $y=-\frac{1}{2}x+4$ $y=-\frac{1}{2}x-\frac{1}{3}$ $y=-2x-5$ $2x-y=6$
		8.3.2.2	Analyze polygons on a coordinate system by determining the slopes of their sides. ***(1.7)*** *For example*: Given the coordinates of four points, determine whether the corresponding quadrilateral is a parallelogram. *Item Specifications* • Vocabulary allowed in items: vocabulary given at previous grades	A rectangle is drawn on a coordinate grid. The equation for 1 side of the rectangle is $3x-2y=12$. Which could be an equation for another side of the rectangle? **A.** $y=\frac{3}{2}x+5$ **B.** $y=3x+12$ **C.** $y=-\frac{3}{2}x-12$ **D.** $y=2x-5$
		8.3.2.3	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 and perpendicular to the given line, symbolically and graphically. ***(1.7)*** *Item Specifications* • Vocabulary allowed in items: vocabulary given at previous grades	The graph of a line is shown.  What is the equation of a line that is perpendicular to the line shown and goes through the point (3, −1)? **A.** $y=-\frac{4}{3}x-5$ **B.** $y=-\frac{4}{3}x+3$ **C.** $y=\frac{4}{3}x-5$ **D.** $y=\frac{4}{3}x+3$

Strand	Standard	No.	Benchmark (8th Grade)	Sampler Item
Data Analysis & Probability **MCA 6-8 Items** **Modified MCA 6-7 Items**	Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data. **MCA 6-8 Items** **Modified MCA 6-7 Items**	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. ***(2.7)*** *Item Specifications* • Data sets are limited to no more than 30 data points • Vocabulary allowed in items: scatterplot, line of best fit, correlation &vgapg.	The scatterplot shows the relationship between the number of calories and the number of grams of fat in some foods. Graph the line of best fit for this data. Click on 2 points on the grid. A line will connect the points. 
		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. ***(2.7)*** *For example*: Given a scatterplot relating student heights to shoe sizes, predict the shoe size of a 5'4" student, even if the data does not contain information for a student of that height. *Item Specifications* • Vocabulary allowed in items: scatterplot, line of best fit &vgapg.	The scatterplot shows the heights of Ferris wheels and the years they were built.  Which statement is true about the scatterplot? A. All Ferris wheels built before 1980 must have been less than 60 meters high. B. Based on the line of best fit, Ferris wheel heights increase about 25 meters every 10 years. C. Each Ferris wheel is taller than all Ferris wheels that were built earlier. D. Each year, more Ferris wheels were built than the year before.
		8.4.1.3	Assess the reasonableness of predictions using scatterplots by interpreting them in the original context. ***(2.7)*** *For example*: A set of data may show that the number of women in the U.S. Senate is growing at a certain rate each election cycle. Is it reasonable to use this trend to predict the year in which the Senate will eventually include 1000 female Senators? *Item Specifications* • Vocabulary allowed in items: scatterplot, line of best fit &vgapg. No Example Question on the State Sampler	(none)

8th Grade Number and Operation

Standard:

Content:

- Real Numbers
- Rational/Irrational
- Square root
- Real Numbers
- Rational Approximations
- +/- integer exponents
- Equivalent numerical expression
- Scientific Notation
- Significant Digits

Skills:

- Classify numbers as rational or irrational.
- Recognize whether the result of an operation will be rational or irrational.
- Locate real numbers on a number line.
- Determine rational approximations.
- Simplify expressions involving positive and negative integer exponents.
- Recognize and interpret calculator display in scientific notation.
- Express numbers in scientific notation using significant digits.
- Multiply and divide scientific notation.

8th Grade Algebra

Standard: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and non-linear functions.

Content:
- Function = Relationship
- Independent/ Dependent variables
- Functional Notation
- Equations
- Linear Functions
- Graphs
- Input/Output variables
- Arithmetic sequence
- Geometric sequence
- Non-linear functions

Skills:
- Define functions using functional and y= notations.
- Use linear functions to represent real-world and mathematical situations.
- Know that the graph of linear functions are lines.
- Identify and arithmetic sequence (use this terminology) as a linear function.
- Identify and geometric sequence (use this terminology) as a exponential function.

Standard: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

Content:
- Tables
- Verbal descriptions
- Graphical properties
- Slope
- Rate of change
- Y-intercept
- Coefficient

Skills:
- Translate between linear (arithmetic) tables, graphs, equations and descriptions.
- Use the above mentioned to solve problems.
- Find slope and y-intercept from graphs.
- Know how coefficients (slope) effect graphs and check with a calculator.

- Translate between exponential (geometric) tables, graphs, equations and descriptions.
- Use the above mentioned to solve problems.

Standard: Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.

<u>Content</u>:
- Algebraic expressions
- Radicals
- Absolute values
- Equivalent expressions
- Associative, distributive, communicative properties
- Order of operations

<u>Skills</u>:
- Evaluate algebraic expressions, including expressions containing radicals and absolute values.
- Use associative, commutative and distributive laws, and the order of operations to evaluate and simplify expressions.

Standard: Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

<u>Content</u>:
- Multi-step equations
- Multi-variable equations
- Linear inequalities
- Slope-intercept
- Point-slope
- Standard form
- Absolute values
- Solutions
- Systems of linear equations

<u>Skills</u>:
- Solve equations using symbolic method.
- Write linear equations in slope-intercept, point-slope and standard forms.
- Use linear inequalities to represent and solve relationships in various contexts and graph solutions on a number line.
- Translate and solve linear equations, inequalities and absolute value, then graph the solution on a number line.

8^{th} Grade Geometry and Measurement

Standard: Solve problems involving right triangles using the Pythagorean Theorem and its converse.

Content:
- Pythagorean Theorem
- Right Triangles
- Computer Software ????

Skills:
- Determine distance between two points on a coordinate system using Pythagorean Theorem if necessary.
- Use the Pythagorean Theorem to solve right triangle problems.
- Informally justify the Pythagorean Theorem.

Standard: Solve problems involving parallel and perpendicular lines on a coordinate system.

Content:
- Parallel Lines
- Perpendicular Lines
- Polygons
- Coordinate System

Skills:
- Given the coordinates of four points, determine whether the corresponding quadrilateral is a parallelogram.
- Examine the relationship between lines and their equations.
- Given a line and a coordinate of a point not on the line, find the equations and graph lines parallel and perpendicular to the given line.

8th Grade Data Analysis

Standard: Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.

Content:

- Scatterplots
- Titles and labels of above mentioned
- Graphing Technology
- Line of best fit
- Predictions in original context

Skills:

- Collect, display and interpret data using scatterplots.
- Estimate a line of best fit.
- Use graphing technology to display and find line of best fit for a scatterplot.
- Predict by interpreting the scatterplots and line of best fit.