5th Grade MCA3 Standards, Benchmarks, Examples, Test Specifications & Sampler Questions

Strand	Standard	No.	Benchmark (5th Grade)	Sampler Item
Number & Operation **MCA 18-22 Items** **Modified MCA 11-14 Items**	Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic. **MCA 6-8 Items** **Modified MCA 4-6 Items**	5.1.1.1	Divide multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms. Recognize that quotients can be represented in a variety of ways, including a whole number with a remainder, a fraction or mixed number, or a decimal. ***(2)*** *For example*: Dividing 153 by 7 can be used to convert the improper fraction $\frac{153}{7}$ to the mixed number $21\frac{6}{7}$. *Item Specifications* • Dividends may not be more than 4 digits • Divisors may not be more than 2 digits • Fractional remainders are not required to be given in lowest terms • Allowable division notation: , fraction bar • Vocabulary allowed in items: remainder, ***"and vocabulary given at previous grades" (&vgapg.)***	Divide. $2{,}564 \div 8$ **A.** 32 r4 **B.** 308 **C.** $320\frac{1}{5}$ **D.** 320.5 **Modified Example** Divide. $1{,}308 \div 6$ **A.** 201 **B.** 211 **C.** 218
		5.1.1.2	Consider the context in which a problem is situated to select the most useful form of the quotient for the solution and use the context to interpret the quotient appropriately. ***(2)*** *For example*: If 77 amusement ride tickets are to be distributed equally among 4 children, each child will receive 19 tickets, and there will be one left over. If $77 is to be distributed equally among 4 children, each will receive $19.25, with nothing left over. *Item Specifications* • Dividends may not be more than 4 digits • Divisors may not be more than 2 digits • Fractional remainders are not required to be given in lowest terms • Items may require interpretation of when decimals should be rounded (e.g., with money) • Vocabulary allowed in items: remainder, &vgapg.	Jan has 500 pieces of paper. She prints as many copies as possible of a 16-page report. How many pieces of paper are left? **A.** 4 **B.** 9 **C.** 25 **D.** 31 **Modified Example** A teacher had 157 books to share equally with 7 classes. He gave as many books as possible to each class. How many books were left over? **A.** 3 **B.** 22 **C.** 150
		5.1.1.3	Estimate solutions to arithmetic problems in order to assess the reasonableness of results. ***(2)*** *Item Specifications* • Assessed within 5.1.1.4	(none) No Example Question on the State Sampler

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		5.1.1.4	Solve real-world and mathematical problems requiring addition, subtraction, multiplication and division of multi-digit whole numbers. Use various strategies, including the inverse relationships between operations, the use of technology, and the context of the problem to assess the reasonableness of results. ***(2)*** *For example*: The calculation 117 ÷ 9 = 13 can be checked by multiplying 9 and 13. *Item Specifications* • Solutions are less than 1,000,000 • Multiplication is limited to no more than three-digit numbers by no more than three-digit numbers • Division is limited to no more than four-digit numbers by no more than two-digit numbers • Fractional remainders are not required to be given in lowest terms • Vocabulary allowed in items: vocabulary given at previous grades	A theater sold 1,500 tickets. There were 852 adult tickets and the rest were child tickets. Each adult ticket was $7.00 and each child ticket was $3.50. How much money was made in ticket sales? Type your answer in the box. $ ☐ **(and)** A bookcase has 4 shelves. The bottom shelf has 10 books. Each of the other shelves has 5 more books than the shelf below it. How many books are in the bookcase? ○ **A.** 25 ○ **B.** 40 ○ **C.** 55 ○ **D.** 70
	Read, write, represent and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations.	5.1.2.1	Read and write decimals using place value to describe decimals in terms of groups from millionths to millions. ***(1.6)*** *For example*: Possible names for the number 0.0037 are: 37 ten thousandths 3 thousandths + 7 ten thousandths; a possible name for the number 1.5 is 15 tenths. *Item Specifications* • Vocabulary allowed in items: place value, &vgapg.	Which number has a 5 in the ten thousandths place? ○ **A.** 0.20815 ○ **B.** 0.30256 ○ **C.** 0.40571 ○ **D.** 0.50098
		5.1.2.2	Find 0.1 more than a number and 0.1 less than a number. Find 0.01 more than a number and 0.01 less than a number. Find 0.001 more than a number and 0.001 less than a number. ***(1.6)*** *Item Specifications* • Vocabulary allowed in items: place value, &vgapg.	Johan's race time was 45.03 seconds. Kyle's race time was 0.1 second less than Johan's time. What was Kyle's race time? ○ **A.** 44.03 seconds ○ **B.** 44.93 seconds ○ **C.** 45.13 seconds ○ **D.** 45.14 seconds

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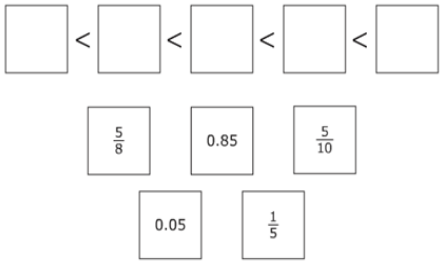
	MCA 6-8 Items **Modified MCA 3-4 Items**	5.1.2.3	Order fractions and decimals, including mixed numbers and improper fractions, and locate on a number line. ***(1.6)*** *For example*: Which is larger 1.25 or $\frac{6}{5}$? *Another example*: In order to work properly, a part must fit through a 0.24 inch wide space. If a part is $\frac{1}{4}$ inch wide, will it fit? *Item Specifications* • Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 15, 16 and 20 • Mixed numbers are less than 10 • Vocabulary allowed in items: place value, &vgapg.	Put the numbers in order from least to greatest. Click and drag each number into the inequality.  **(and)** Five points are shown on a number line. Between which 2 points is $\frac{7}{16}$ located? ○ **A.** *J* and *K* ○ **B.** *K* and *L* ○ **C.** *L* and *M* ○ **D.** *M* and *N* **Modified Example** Tony recorded the money he spent each week in a table. **Tony's Spending** | Week | Amount Spent | |---|---| | 1 | $26.06 | | 2 | $19.47 | | 3 | $26.13 | What is the **greatest** amount of money Tony spent in a week? ○ **A.** $26.06 ○ **B.** $19.47 ○ **C.** $26.13

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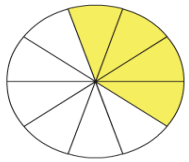
		5.1.2.4	Recognize and generate equivalent decimals, fractions, mixed numbers and improper fractions in various contexts. ***(1.6)*** *For example*: When comparing 1.5 and $\frac{19}{12}$, note that 1.5 = $1\frac{1}{2}$ = $1\frac{6}{12}$ = $\frac{18}{12}$, so 1.5 < $\frac{19}{12}$. *Item Specifications* • Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 25, 50 and 100 • Mixed numbers are less than 10 • Vocabulary allowed in items: place value, &vgapg.	Lydia used $\frac{1}{25}$ of her notebook paper. What decimal amount did she use? **A.** 0.04 **B.** 0.4 **C.** 1.25 **D.** 2.5 **Modified Example** The model is shaded to represent $\frac{4}{10}$.  How is $\frac{4}{10}$ written as a decimal? **A.** 0.4 **B.** 0.04 **C.** 0.004
		5.1.2.5	Round numbers to the nearest 0.1, 0.01 and 0.001. ***(1.6)*** *For example*: Fifth grade students used a calculator to find the mean of the monthly allowance in their class. The calculator display shows 25.80645161. Round this number to the nearest cent. *Item Specifications* • Numbers can be given up to millionths • Vocabulary allowed in items: place value, &vgapg.	What is 0.45831 rounded to the nearest thousandth? **A.** 0.45 **B.** 0.458 **C.** 0.459 **D.** 0.4583
	Add and subtract fractions, mixed numbers and decimals to solve real-world and mathematical problems. **MCA 6-8 Items** **Modified MCA 4-6 Items**	5.1.3.1	Add and subtract decimals and fractions, using efficient and generalizable procedures, including standard algorithms. ***(2)*** *Item Specifications* • Addends, minuend and subtrahend denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12 • Mixed numbers are less than 10 • Items do not require conversion between fractions and decimals • Items must not have context • Vocabulary allowed in items: vocabulary given at previous grades	Add. $45.908 + 3.26$ **A.** 46.234 **B.** 49.168 **C.** 49.24 **D.** 78.508 **Modified Example** Kita is making 3 types of cookies. The table shows the amount of chocolate she needs for each type of cookie. **Chocolate Needed for Cookies** Type of Cookie / Amount of Chocolate Needed Chocolate Chip / $1\frac{1}{2}$ cups Chocolate Crinkle / $2\frac{1}{4}$ cups Chewy Chocolate / $\frac{3}{4}$ cup How much chocolate does Kita need **altogether**? **A.** 4 cups **B.** $4\frac{1}{4}$ cups **C.** $4\frac{1}{2}$ cups

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		5.1.3.2	Model addition and subtraction of fractions and decimals using a variety of representations. ***(2)*** *For example*: Represent $\frac{2}{3}+\frac{1}{4}$ and $\frac{2}{3}-\frac{1}{4}$ by drawing a rectangle divided into 4 columns and 3 rows and shading the appropriate parts or by using fraction circles or bars. *Item Specifications* • Addends, minuend and subtrahend denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12 • Mixed numbers are less than 10 • Items do not require conversion between fractions and decimals • Vocabulary allowed in items: vocabulary given at previous grades	A fraction model is shown. What is represented by the model? ○ **A.** $\frac{2}{1}-\frac{3}{5}$ ○ **B.** $\frac{2}{3}-\frac{3}{8}$ ○ **C.** $\frac{2}{3}-\frac{1}{5}$ ○ **D.** $\frac{3}{8}-\frac{7}{24}$
		5.1.3.3	Estimate sums and differences of decimals and fractions to assess the reasonableness of results. ***(2)*** *Item Specifications*: Assessed within 5.1.3.4 No Example Question on the State Sampler	**(none)**
		5.1.3.4	Solve real-world and mathematical problems requiring addition and subtraction of decimals, fractions and mixed numbers, including those involving measurement, geometry and data. ***(2)*** *For example*: Calculate the perimeter of the soccer field when the length is 109.7 meters and the width is 73.1 meters. *Item Specifications* • Addends, minuend and subtrahend denominators are limited to 2, 3, 4, 5, 6, 8, 10 and 12 • Mixed numbers are less than 10 • Fractions and decimals may be used within the same item • Vocabulary allowed in items: vocabulary given at previous grades	Jill is $48\frac{5}{8}$ inches tall. Lei is 47.5 inches tall. What is the difference in their heights? ○ **A.** 0.125 inch ○ **B.** 1.08 inches ○ **C.** 1.125 inches ○ **D.** 1.62 inches **Modified Example** A rectangular garden is 28 feet long and 15 feet wide. 15 feet 28 feet What is the **perimeter** of the garden? ○ **A.** 43 feet ○ **B.** 86 feet ○ **C.** 420 feet

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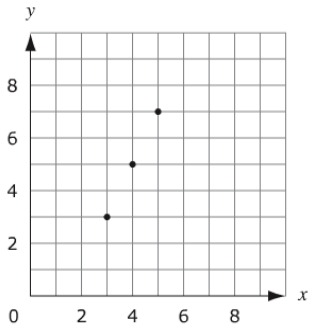
Algebra **MCA 10-14 Items** **Modified MCA 7-9 Items**	Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems. **MCA 4-6 Items** **Modified MCA 3-4 Items**	5.2.1.1	Create and use rules, tables, spreadsheets and graphs to describe patterns of change and solve problems. ***(3)*** *For example*: An end-of-the-year party for 5th grade costs $100 to rent the room and $4.50 for each student. Know how to use a spreadsheet to create an input-output table that records the total cost of the party for any number of students between 90 and 150. *Item Specifications* • In a growing pattern, 3 applications of the rule must be shown, though not necessarily consecutively • In a table or graph, 3 input-output pairs must be given; pairs are not required to be consecutive • Vocabulary allowed in items: vocabulary given at previous grades	At a movie store, Erin pays a monthly fee and is charged for each movie she rents. The table shows the monthly cost when Erin rents different numbers of movies. **Monthly Cost** | Number of Movies | Total Cost (dollars) | |---|---| | 6 | 33 | | 8 | 39 | | 10 | 45 | How much is the monthly fee that Erin pays? ○ **A.** $3 ○ **B.** $6 ○ **C.** $15 ○ **D.** $18 (and) Which tables follow the rule $y = 2x$? Click on the tables you want to select. | x | y | |---|---| | 4 | 6 | | 8 | 10 | | 16 | 18 | | x | y | |---|---| | 3 | 6 | | 5 | 10 | | 8 | 16 | | x | y | |---|---| | 1 | 2 | | 7 | 14 | | 12 | 24 | | x | y | |---|---| | 10 | 5 | | 20 | 10 | | 30 | 15 | **Modified Example** A pattern is shown. 1 4 16 64 ___?___ What number is next in the pattern? ○ **A.** 68 ○ **B.** 80 ○ **C.** 256
		5.2.1.2	Use a rule or table to represent ordered pairs of positive integers and graph these ordered pairs on a coordinate system. ***(3)*** *Item Specifications* • Scale increments on grids are limited to 1, 2 and 5 • Rules may be expressed using variables • Vocabulary allowed in items: ordered pair, graph, &vgapg.	Three points are shown on a grid.  Which rule was used to plot the points? ○ **A.** $y = x$ ○ **B.** $y = x = 2$ ○ **C.** $y = \frac{1}{2}x + 3$

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	Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers. **MCA 2-3 Items** **Modified MCA 1-2 Items**	5.2.2.1	Apply the commutative, associative and distributive properties and order of operations to generate equivalent numerical expressions and to solve problems involving whole numbers. ***(3)*** *For example*: Purchase 5 pencils at 19 cents and 7 erasers at 19 cents. The numerical expression is 5 × 19 + 7 × 19 which is the same as (5 + 7) × 19. *Item Specifications* • Expressions may not contain nested parentheses • Items must not have context • Vocabulary allowed in items: expression, &vgapg.	An expression is shown. $4+3(6+10)\div 2$ What is the value of the expression? **A.** 16 **B.** 26 **C.** 28 **D.** 56 **Modified Example** Solve. $\frac{3\times(1+5)}{2}$ **A.** 4 **B.** $7\frac{1}{2}$ **C.** 9
	Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.	5.2.3.1	Determine whether an equation or inequality involving a variable is true or false for a given value of the variable. ***(2)*** *For example*: Determine whether the inequality 1.5 + x < 10 is true for x = 2.8, x = 8.1, or x = 9.2. *Item Specifications* • Allowable symbols: < and > • Items must not have context • Vocabulary allowed in items: inequality, &vgapg.	Which value makes the equation $5b+15=30$ true? **A.** $b=3$ **B.** $b=9$ **C.** $b=10$ **D.** $b=75$
	MCA 4-6 Items **Modified MCA 3-4 Items**	5.2.3.2	Represent real-world situations using equations and inequalities involving variables. Create real-world situations corresponding to equations and inequalities. ***(2)*** *For example*: 250 – 27 × a = b can be used to represent the number of sheets of paper remaining from a packet of 250 sheets when each student in a class of 27 is given a certain number of sheets. *Item Specifications* • < and > symbols are allowed • Vocabulary allowed in items: inequality, &vgapg.	Yesterday, Jamal read 17 pages in his book. Today, he read more pages than he read yesterday. Which inequality shows p, the number of pages Jamal could have read today? **A.** $p<17$ **B.** $p\leq 17$ **C.** $p>17$ **D.** $p\geq 17$ **Modified Example** Miguel has 64 pencils in boxes. There are 8 pencils in each box. Which equation shows b, the number of boxes Miguel has? **A.** $64-8=b$ **B.** $64\times 8=b$ **C.** $64\div 8=b$

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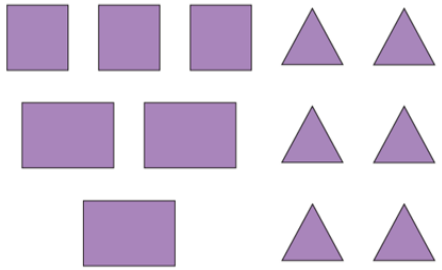
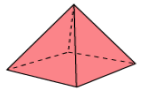
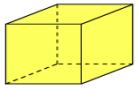
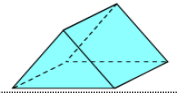
		5.2.3.3	Evaluate expressions and solve equations involving variables when values for the variables are given. ***(2)*** *For example*: Using the formula, $A = \ell w$, determine the area when the length is 5, and the width 6, and find the length when the area is 24 and the width is 4. *Item Specifications* • Items must not have context • Vocabulary allowed in items: expression, &vgapg.	What is the value of $4k+6(j-2)$ when $k=3$ and $j=5$? **A.** 26 **B.** 30 **C.** 40 **D.** 108 **Modified Example** An equation is shown. $x \div 4 = 7$ Which value for x makes the equation true? **A.** 28 **B.** 17 **C.** 11
Geometry & Measurement **MCA 8-10 Items** **Modified MCA 6-8 Items**	Describe, classify, and draw representations of three-dimensional figures. **MCA 3-4 Items** **Modified MCA 2-3 Items**	5.3.1.1	Describe and classify three-dimensional figures including cubes, prisms and pyramids by the number of edges, faces or vertices as well as the types of faces. ***(2)*** *Item Specifications* • Prisms and pyramids are limited to triangular, rectangular, pentagonal, hexagonal and octagonal • Vocabulary allowed in items: cube, prism, pyramid, cone, cylinder, edge, face, base, three-dimensional, triangular, rectangular, &vgapg.	How many edges does a hexagonal prism have? **A.** 6 **B.** 8 **C.** 12 **D.** 18 **(and)** Which shapes are needed to make a rectangular pyramid? Click on the shapes you want to select.  **Modified Example** Which three-dimensional figure shown has the **greatest** number of faces? **A.**  **B.**  **C.** 

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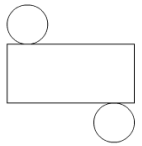
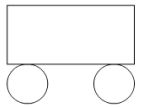
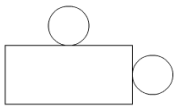
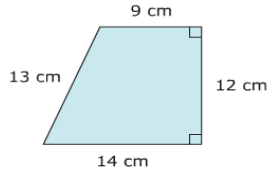
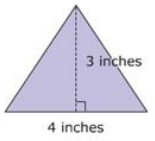
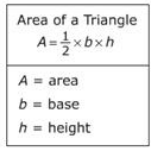
		5.3.1.2	Recognize and draw a net for a three-dimensional figure. ***(2)*** *Item Specifications* • Vocabulary allowed in items: net, cylinder, cube, prism, pyramid, edge, face, base, three-dimensional, triangular, rectangular, &vgapg.	Which net makes a cylinder? A.  B. C.  D. 
	Determine the area of triangles and quadrilaterals; determine the surface area and volume of rectangular prisms in various contexts. **MCA** **5-6 Items** **Modified MCA** **4-5 Items**	5.3.2.1	Develop and use formulas to determine the area of triangles, parallelograms and figures that can be decomposed into triangles. ***(1.5)*** *Item Specifications* • Vocabulary allowed in items: formula, &vgapg.	A trapezoid is shown.  What is the area of the trapezoid? **A.** 48 cm^2 **B.** 138 cm^2 **C.** 168 cm^2 **D.** 173 cm^2 **(and)** A triangle has a height of 25 feet. The length of its base is 12 feet. What is the area of the triangle? Type your answer in the box. ☐ square feet **Modified Example** A triangle is shown. The base, *b*, measures 4 inches. The height, *h*, measures 3 inches.   What is the **area** of the triangle? **A.** 6 square inches **B.** 7 square inches **C.** 12 square inches

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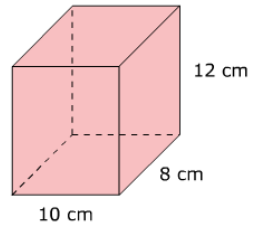
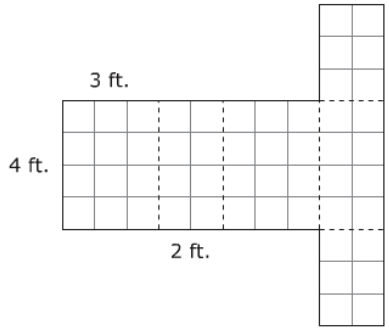
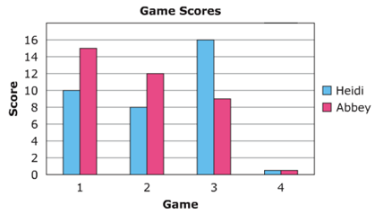
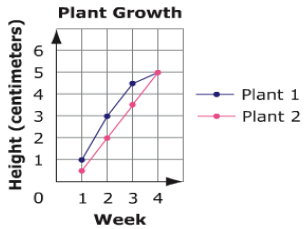
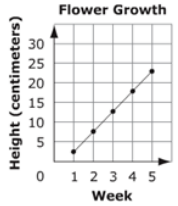
		5.3.2.2	Use various tools and strategies to measure the volume and surface area of objects that are shaped like rectangular prisms. ***(1.5)*** *For example*: Use a net or decompose the surface into rectangles. *Another example*: Measure the volume of a cereal box by using a ruler to measure its height, width and length, or by filling it with cereal and then emptying the cereal into containers of known volume. *Item Specifications* • When finding surface area, a graphic of the prism or net must be given • When finding surface area, dimensions of figures are whole numbers • Surface areas and volumes are no more than 360 • Vocabulary allowed in items: surface area, volume, net, &vgapg.	Amy covers the box shown with paper.  What is the surface area of the box? ○ **A.** 180 sq. in. ○ **B.** 296 sq. in. ○ **C.** 592 sq. in. ○ **D.** 960 sq. in. **Modified Example** The net of a box is shown.  What is the **surface area** of the box? ○ **A.** 24 square feet ○ **B.** 36 square feet ○ **C.** 52 square feet
		5.3.2.3	Understand that the volume of a three-dimensional figure can be found by counting the total number of same-sized cubic units that fill a shape without gaps or overlaps. Use cubic units to label volume measurements. ***(1.5)*** *For example*: Use cubes to find the volume of a small box. *Item Specifications:* Assessed within 5.3.2.2 No Example Question on the State Sampler	(none)

Strand	Standard	No.	Benchmark (5th Grade)	Sampler Item
		5.3.2.4	Develop and use the formulas $V = \ell wh$ and $V = Bh$ to determine the volume of rectangular prisms. Justify why base area B and height h are multiplied to find the volume of a rectangular prism by breaking the prism into layers of unit cubes. ***(1.5)*** *Item Specifications* • The definition of B as the area of the base must be given • Vocabulary allowed in items: volume, base, height, &vgapg.	A rectangular prism has a height of h cm. The area of its base is B cm^2. How much does the volume of the prism increase when the height is increased by 1 cm? ○ **A.** 1 cm^3 ○ **B.** $h+1$ cm^3 ○ **C.** B cm^3 ○ **D.** $B+1$ cm^3
Data Analysis **MCA 6-8 Items** **Modified MCA 6-8 Items**	Display and interpret data; determine mean, median and range. **MCA 6-8 Items** **Modified MCA 6-8 Items**	5.4.1.1	Know and use the definitions of the mean, median and range of a set of data. Know how to use a spreadsheet to find the mean, median and range of a data set. Understand that the mean is a "leveling out" of data. ***(4)*** *For example*: The set of numbers 1, 1, 4, 6 has mean 3. It can be leveled by taking one unit from the 4 and three units from the 6 and adding them to the 1s, making four 3s. *Item Specifications* • When finding mean, data sets contain, at most 9 numbers • When finding median, data sets contain, at most 15 numbers • Numbers are less than 100 • Vocabulary allowed in items: mean, median, range, minimum, maximum, &vgapg.	Anya listed the prices of meals on a menu. $14.85 $10.75 $8.50 $12.45 $9.20 What is the mean price of the meals? ○ **A.** $6.35 ○ **B.** $8.50 ○ **C.** $10.75 ○ **D.** $11.15 **Modified Example** Students are selling candy bars. The table shows how many candy bars 5 students sold this week. **Candy Bars Sold** Student 1 | Student 2 | Student 3 | Student 4 | Student 5 25 | 50 | 42 | 60 | 38 What is the **range** for this set of data? ○ **A.** 13 ○ **B.** 35 ○ **C.** 42

Strand	Standard	No.	Benchmark (5th Grade)	Sampler Item
		5.4.1.2	Create and analyze double-bar graphs and line graphs by applying understanding of whole numbers, fractions and decimals. Know how to create spreadsheet tables and graphs to display data. ***(4)*** *Item Specifications* • Double-bar graphs have no more than 9 categories • Line graphs have no more than 10 data points • Scales are in increments of ½, 1, 2, 4, 5, 10, tenths if in decimal form or must be consistent with real world applications • Vocabulary allowed in items: double-bar graph, line graph, &vgapg.	Heidi and Abbey play 4 games and record their scores in a bar graph. Heidi's total score is 5 more points than Abbey's total score. Complete the bar graph to show possible scores for Heidi and Abbey in game 4. Click on the bar graph where the top of each bar should be.  (and) Maria recorded the heights of 2 plants for 4 weeks.  How much did plant 2 grow from week 1 to week 2? ○ **A.** 1 cm ○ **B.** $1\frac{1}{2}$ cm ○ **C.** 2 cm ○ **D.** $4\frac{1}{2}$ cm **Modified Example** Andie made a graph of the growth of a flower over a period of 5 weeks.  How much did the flower grow from week 4 to week 5? ○ **A.** 1 cm ○ **B.** 5 cm ○ **C.** 10 cm