Kansas State Mathematics Standards and Assessment Guide

Based on the 2005 Kansas State Curricular Standards for Mathematics adopted by the Kansas State Board of Education on July 8, 2003

Grade 6

Developed by the Kansas State Department of Education and Mathematics Specialists in the Private Sector from Kansas

2005

Standard/Benchmark/Indicator						
M.6.1.1.K2a-c						
Standard: Number and Computation						
Benchmark: Number Sense						
Indicator: Compares and orders: a) integers; b) fractions greater than or equal to zero; c)						
decimals greater than or equal to zero through thousandths place						
Explanation of Indicator						
Compare and order numbers to see which is larger or smaller for a set of numbers that include						
positive and negative numbers, fractions and decimals greater than 0.						
Instructional Example						
1. Have student put monthly electric bills for the past year in order from smallest to largest.						
Measure each person's height in the family and order from greatest to least.						
3. Give the student a set of distances to surrounding towns and have them list them from closest						
to furthest away.						
4. Have student order a set of measuring cups using only the fractions 1/8, 1/4, 1/3, 1/2, 2/3, 3/4,						
1, and then have them visually see if they were correct.						
Item Specification						
Category 2: Perform Procedures: 2a. Use numbers to count, order, or denote						
Assessment Item Example						
Which list of integers is in order from least to greatest?						
A0 -4 -2 5 5						
B. -2 3 -4 5 -6						
C. -2 -4 -6 3 5						
D. 5 3 -2 -4 -6						
Correct Answer: A						

Indicator			
M.6.1.1.K2a-c			

M.6.1.1.K4 N

Standard: Number and Computation

Benchmark: Number Sense

<u>Indicator</u>: Knows and explains numerical relationships between percents, decimals, and fractions between 0 and 1

Explanation of Indicator

Know how to convert between percents, decimals, and fractions between 0 and 1 ($25\% = 0.25 = \frac{1}{4}$).

Instructional Example

Find advertisements in which a percent or fraction is given for a sale such as everything in the store $\frac{1}{2}$ or 50%, and have student convert between percent, decimal, and fraction.

Item Specification

Category 1: Memorize Facts/Definitions/Formulas: 1b. Recall or recognize mathematical terms, definitions, or concepts

Category 3: Demonstrate Understanding of Mathematical Ideas: 3a. Communicate mathematical ideas or rules and/or explain the process

Assessment Item Example

Which figure is 70% shaded?



Indicator		
M.6.1.1.K4		

M.6.1.4.K2a,f N

Standard: Number and Computation

Benchmark: Computation

<u>Indicator</u>: Performs and explains these computational procedures: a) divides whole numbers through a 2-digit divisor and a 4-digit dividend and expresses the remainder as a whole number, fraction, or decimal

Explanation of Indicator

Use division of whole numbers greater than 0 by up to 2-digit that may have remainders. If there is a remainder, express as a decimal or fraction.

Instructional Example

- 1. If you need to divide \$42 between 5 people, how much will each person receive?
- 2. If you have 12 pizzas that have 10 pieces to a pizza, how many pieces will each person get if there are 40 people at a party?

Item Specification

Category 2: Perform Procedures: 2b. Do computational procedures or algorithms Category 3: Demonstrate Understanding of Mathematical Ideas: 3a. Communicate mathematical ideas or rules and/or explain the process

Assessment Item Example

Ms. Avery set aside 20 minutes for 3 student presentations. She divided the time evenly among the 3 students. How many minutes did each student have to make a presentation?

A. ²minutes

B. 2

 $\overline{2}$ minutes

C. ⁶minutes

D. 6²/₆

³ minutes

	Indicator		
	M.6.1.4.K2a,f		

Standard/Benchmark/Indicator					
M.6.2.1.K4 Standardy Algebra					
Senchmark: Patterns					
Denumark. Patterns					
<u>Indicator</u> : States the rule to find the next number of a pattern with one operational change (addition, subtraction, multiplication, division) to move between consecutive terms					
Explanation of Indicator					
Find the rule (addition subtraction multiplication or division) for a set of numbers in a pattern in order					
to extend the pattern past the last term given					
Instructional Example x					
XXXXX					
xxxxxxxx 2, 6, 18, 54, 162 64, 32,					
16, 8, 4,					
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX					
Give the student a variety of patterns (examples are given above), both visual and numerical, to find					
the next term in the pattern using addition, subtraction, multiplication, and division.					
Item Specification					
Category 4: Conjecture/Generalize/Prove: 4d. Find a mathematical rule to generate a pattern or					
number sequence					
Assessment Item Example					
The numbers shown below follow a pattern.					
79 68 57 46					
Which rule could be used to find the next number in this pattern?					
A subtract 11 from the previous number					
B add 11 to the previous number					
C subtract 10 from the previous number					
D add 10 to the previous number					
Correct Answer: A					

	Indicator	
	M.6.2.1.K4	

M.6.3.1.K7a-b

Standard: Geometry

Benchmark: Geometric Figures and Their Properties

<u>Indicator</u>: Classifies: a) angles as right, obtuse, acute, or straight; b) triangles as right, obtuse, acute, scalene, isosceles, or equilateral

Explanation of Indicator

Classify angles as right, obtuse, acute, or straight; triangles by their angles as right, obtuse, or acute; and triangles by their sides as scalene, isosceles, or equilateral. Angles that are right = 90° , obtuse are > 90° but < 180° , acute are < 90° but > 0° , and straight = 180° .

Triangles that are right have one right angle, acute have three angles $< 90^{\circ}$, and obtuse have one angle $> 90^{\circ}$. Triangles that are scalene have no sides the same length, isosceles have two sides the same length, and equilateral have all three sides the same length.

Instructional Example

- 1. Have student identify angles they can find around the home or in newspapers, magazines, or other print as right, obtuse, acute, or straight.
- 2. Have student identify triangles they can find around the home or in newspapers, magazines, or other print as right, obtuse, acute, straight, scalene, isosceles, or equilateral.

Item Specification

Category 1: Memorize Facts/Definitions/Formulas: 1b. Recall or recognize mathematical terms, definitions, or concepts

Assessment Item Example

An angle is shown below.

109

Which term describes the angle?

- A. right
- **B.** acute
- C. obtuse
- **D.** straight

		Indicator	
		M.6.3.1.K7a-b	

M.6.3.2.K3b Standard: Geometry Benchmark: Measurement and Estimation Indicator: Converts: b) within the metric system using the prefixes: kilo, hector, deka, deci, centi, and milli **Explanation of Indicator** Convert within the metric system of measurement for length (meters), mass (grams), and volume (liters) for the prefixes kilo, hector, deka, deci, centi, and milli. Convert means to change from one measurement to another that is equivalent (in the customary measurement system 24 inches would equal 2 feet). Instructional Example Have student use labels from a variety of household products to identify the metric measurement and then convert to another prefix. An example is a 16 oz bottle of soda has a volume of 473 milliliters (ml) can be converted to 47.3 centiliters, 4.73 deciliters, 0.473 liters, 0.0473 dekaliters, 0.0073 hectoliters, or 0.000473 kiloliters. **Item Specification** Category 1: Memorize Facts/Definitions/Formulas: 1c. Recall formulas or computational procedures

Category 2: Perform Procedures: 2c. Follow procedures or instructions

Assessment Item Example

Toni's hand is 15 centimeters long. How many millimeters long is Toni's hand?

- A. 0.15 millimeter
- **B.** 1.5 millimeters
- C. 150 millimeters
- D. 1500 millimeters

		Indicator
		M.6.3.2.K3b

M.6.3.3.K1

Standard: Geometry

Benchmark: Transformational Geometry

Indicator: Identifies, describes, and performs one or two transformations (reflection, rotation,

translation) on a two-dimensional figure

Explanation of Indicator

The student will understand, demonstrate, and explain one or two transformations (reflection/flip, rotation/turn, and/or translation/slide) of an object. Flip is to flip over, turn is to rotate, and slide is to move across a flat surface.

Instructional Example

- 1. The student will help or watch a reflection/flip of a pancake, followed by a rotation/turn.
- 2. The student will perform a rotation/turn of an object, followed by a reflection/flip.
- 3. The student will perform a translation/slide of an object across the floor or table, followed by a rotation/turn.

Item Specification

Category 1: Memorize Facts/Definitions/Formulas: 1b. Recall or recognize mathematical terms, definitions, or concepts

Category 2: Perform Procedures: 2c. Follow procedures or instructions

Category 3: Demonstrate Understanding of Mathematical Ideas: 3a. Communicate mathematical ideas or rules and/or explain the process

Assessment Item Example

The image of a star shown on a coordinate grid undergoes one transformation. The first image and final image are shown below.



Which transformation would give this result?

- **A.** a reflection across the *y*-axis
- **B.** a reflection across the *x*-axis
- **C.** a translation across the *x*-axis
- **D.** a translation across the *y*-axis

Indicator					
M.6.3.3.K1					

M.6.3.4.K3a-b

Standard: Geometry

Benchmark: Geometry From An Algebraic Perspective

<u>Indicator</u>: Uses all four quadrants of the coordinate plane: a) identify the ordered pairs of integer values on a given graph; b) plot the ordered pairs of integer values

Explanation of Indicator

Identify and plot points on a coordinate system divided into four areas (quadrants). The coordinate plane is divided into four sections by two number lines (labeled the horizontal and vertical axis with two letters such as x and y) that perpendicularly intersect to form the origin (starting point for graphing or identifying points already on the plane. An ordered pair such as (3, -2) means three positive units to the right of the origin and then 2 units down from the horizontal axis.

Instructional Example

Have students make a coordinate plane on a piece of graph paper, draw a stick drawing of an animal or object on the graph, and then have them identify the points that someone would use to draw the figure with in the same location and same size on the another piece of graph paper. Have them order the ordered pairs so the you would connect the dots as they are graphed to make the drawing.

Item Specification

Category 1: Memorize Facts/Definitions/Formulas: 1b. Recall or recognize mathematical terms, definitions, or concepts

Category 3: Demonstrate Understanding of Mathematical Ideas: 3b. Use representations to model mathematical ideas

Assessment Item Example

Donya wants to graph the ordered pair (3, -3) on the coordinate grid below.



Which point shows the ordered pair (3, -3)?

- **A.** R
- **B.** S
- **C.** T
- **D.** U

Indicator		
M.6.3.4.3a-b		

M.6.4.1.K.2

Standard: Data

Benchmark: Probability

<u>Indicator</u>: Lists all possible outcomes of an experiment or simulation with a compound event composed of two independent events in a clear and organized way

Explanation of Indicator

List all the possible ways something can happen in an experiment with two events that happen together but are not related to one another. Example would be having three pairs of shoes (red, blue, and black) and four pair of socks (yellow, blue, black, and white) and picking one pair of shoes and a pair of socks at random.

Instructional Example

Have the student set up an experiment such as the one above and list all possible outcomes. (red shoes, yellow socks), (red shoes, blue socks), (red shoes, black socks), (red shoes, white socks), (blue shoes, yellow socks), (blue shoes, blue socks), (blue shoes, black socks), (blue shoes, white socks), (black shoes, yellow socks), (black shoes, blue socks), (black shoes, black socks), (black

Item Specification

Category 2: Perform Procedures: 2e. Organize or display data

Category 3: Demonstrate Understanding of Mathematical Ideas: 3b. Use representations to model mathematical ideas

Assessment Item Example

The table below shows the names of the players on team A and team B for a competition.

Team Players

Team A	Team B
Betty	Michelle
Carol	Lisa
	Maria

For each round, one player from team A and one player from team B are chosen. Which list represents all the possible combinations

Α.	Betty, Carol Michelle, Lisa Maria	В.	Betty, Michelle Carol, Lisa Maria
C.	Betty, Michelle Betty, Lisa Carol, Maria Carol, Michelle	D.	Betty, Michelle Betty, Lisa Betty, Maria Carol, Michelle

Carel, Michell Carel, Lisa Carel, Maria

	Indicator		
	M.6.4.1.K2		

M.6.4.1.K4

Standard: Data

Benchmark: Probability

<u>Indicator</u>: Represents the probability of a simple event in an experiment or simulation using fractions and decimals

Explanation of Indicator

The probability of an event happening in a random experiment is the ratio (fraction) of the number of successful outcomes as the numerator over the total number of outcomes as the denominator. Convert fraction to a decimal by dividing numerator by denominator to get a decimal. An example would be the probability of rolling an even number on a die would be 3/6 which can be simplified to $\frac{1}{2}$ or 0.5 as a decimal (1 divided by 2).

Instructional Example

- 1. Have student construct an experiment using a die to find the probability of different outcomes in the experiment, such as rolling a 1, 2, 3, 4, 5, or 6 would all be 1/6 or 1 divided by 6 which equals 0.16666.... or 0.17 rounded to the nearest hundredth.
- 2. Have student put several different colored socks in a bag and knowing what colors and how many of each they put in the bag write the probabilities for drawing one sock and the color being drawn out; such as 4 black socks, 3 white socks, and 3 brown socks are put in a bag and probability of black would be 4/10 = 2/5 = 0.4, probability of white and brown would both be 3/10 or 0.3.

Item Specification

Category 1: Memorize Facts/Definitions/Formulas: 1b. Recall or recognize mathematical terms, definitions, or concepts

Category 2: Perform Procedures: 2b. Do computational procedures or algorithms Category 4: Conjecture/Generalize/Prove: 4f. Identify faulty arguments or identify misrepresentations of data

Assessment Item Example

Mary has a bag with the following colored marbles: 5 white marbles, 4 green ones, 6 red ones, and 10 blue ones. Mary reached in the bag and pulled out a marble. Which decimal represents the chance that the marble is white?

- **A.** 0.05
- **B.** 0.2
- **C.** 0.25
- **D.** 0.8

	Indicator	
	M.6.4.1.K4	

M.6.1.3.A2 N

Standard: Number and Computation

Benchmark: Estimation

<u>Indicator</u>: Estimates to check whether or not the result of a real-world problem using rational numbers and/or the irrational number pi is reasonable and makes predictions based on the information

Explanation of Indicator

In real life situations, it is a good idea to do estimation to check whether the exact answer is reasonable and to justify if it is or isn't a reasonable answer.

Instructional Example

1. Have student mentally estimate the amount of a small purchase while standing in line at the check out register to see how close their estimate comes to the exact total due and if the total due is reasonable. Once in a while the estimate may demonstrate an error has been made by the person operating the checkout register or in the amount the register has been programmed to charge for an estimate. One such example I remember would be purchasing 8 legal sized envelopes and the total came to \$308 and some change. Clearly this didn't require a mental estimation to see there was an error unless maybe they were gold envelopes, but what if the envelopes cost \$0.29 and the total came to \$4.53, would this be reasonable?

Item Specification

Category 4: Conjecture/Generalize/Prove: 4a. Determine the truth of a mathematical pattern, a mathematical statement, and/or proposition or make predictions

Category 5: Solve Non-routine Problems/Make Connections: 5b. Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals

Assessment Item Example

Michael wants to put carpet on the rectangular floor in a hallway. The hallway measures 6.2 feet (ft) by 4.8 ft. Which is the best ESTIMATE of the total amount of carpet needed to completely cover the hallway floor?

 $\mathbf{A} \quad 10 \text{ ft}^2$

- **B** 25 ft^2
- $C \quad 30 \text{ ft}^2$
- **D** 45 ft^2

		Indicator	
		M.6.1.3.A2	

M.6.1.4.A1b

Standard: Number and Computation

Benchmark: Computation

<u>Indicator</u>: Generates and/or solves one- and two-step real-world problems with rational numbers using the computational procedures: b) addition, subtraction, multiplication, and division of decimals through hundredths place

Explanation of Indicator

Solve real-world problems by using one or two operations including addition, subtraction, multiplication, and/or division.

Instructional Example

- Have student write and solve equations for different situations that may occur in everyday situations such as finding the approximate amount it would cost to visit a relative if gas for the vehicle costs \$2 per gallon, the car gets 25 miles per gallon and it is 400 miles to the relative's home (C = \$2 • 400 ÷ 25).
- 2. Have student figure the amount of miles you could travel on \$60 worth of gas.
- 3. If apples costs \$0.50 and soda pop costs \$0.75, how much would 8 apples and 4 sodas cost?
- 4. If your have \$7.50 and you want to buy 8 apples, how many sodas could you buy?

Item Specification

Category 2: Perform Procedures: 2d. Solve equations, formulas, or routine word problems Category 5: Solve Non-routine Problems/Make Connections: 5b. Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals

Assessment Item Example

Britney needs 2.5 cups of flour to bake cookies. Her measuring cup will hold 0.5 cups of flour. How many times must Britney fill the measuring cup to measure 2.5 cups of flour?

- **A.** 1.25
- **B**. 2
- **C.** 3.75
- **D.** 5

		Indicator
		M.6.1.4.A1b

M.6.2.2.A1b Standard: Algebra Benchmark: Variables, Equations, and Inequalities Indicator: Represents real-world problems using variables and symbols to: b) write and/or solve one-step equations (addition, subtraction, multiplication, and division) Explanation of Indicator Write and solve one-step equations for real-world situations using addition, subtraction, multiplication and division. Instructional Example If it is determined that a small dog eats 2 ounces (oz) of food per day, how many days will a 12 oz can last the dog? The number of days would be represented by $d = 12 \div 2$ or 6 days In auto racing, if a driver finished the race for places higher tan he started, and he finished in 1st place, in what place did he start the race? The equation would be written as y - 4 = 1. The answer is v = 5. Item Specification Category 2: Perform Procedures: 2d. Solve equations, formulas, or routine word problems Category 3: Demonstrate Understanding of Mathematical Ideas: 3d. Develop and/or explain relationships between concepts Category 5: Solve Non-routine Problems/Make Connections: 5b. Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals Assessment Item Example Carol read $\frac{1}{2}$ as many pages as Jake. Carol read 10 pages and Jake read p pages. Which equation best represents this situation? 10 = p + 2Α. $10 = p \cdot 2$ Β.

- C. $10 = p \cdot \frac{1}{2}$
- D. $10 = p - \frac{1}{2}$

Indicator			
M.6.2.2.A1b			

M.6.3.2.A1a-b Standard: Geometry Benchmark: Measurement and Estimation Indicator: Solves real-world problems by applying these measurement formulas: a) perimeter of polygons using the same unit of measurement; b) areas of squares, rectangles, and triangles using the same unit of measurement **Explanation of Indicator** Solve real-world problems using perimeter of a variety of shapes with the same unit of measure and area of squares, rectangles, and triangles with the same unit of measure. Perimeter is distance around a figure and area is the amount of surface covered inside the figure. Instructional Example 1. Using a variety of food containers, have student cut them up into shapes to find perimeter and area of. 2. Have student draw a variety of shapes, measure and label the sides, and find perimeter of the figures. 3. Have student draw a variety of squares, rectangles, and triangles, measure and label the sides, and fine the perimeter and area. 4. Have student measure rooms in your home to find the perimeter and area of the rooms. Item Specification Category 2: Perform Procedures: 2d. Solve equations, formulas, or routine word problems Category 5: Solve Non-routine Problems/Make Connections: 5b. Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals **Assessment Item Example** Terry makes a window in the side of his tree house. The dimensions of the window are shown below. 24 in 25 in

7 in

Terry wants to put trim around the edge of the window. Exactly how much trim does he need?

- 28 in Α.
- 56 in Β.
- С. 84 in
- 168 in D.

Indicator		
M.6.3.2.A1a-b		