

# 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 4

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

2005

**Standard/Benchmark/Indicator**

M.4.1.2.K1

Standard: Number and ComputationBenchmark: Number Systems and Their PropertiesIndicator: Identifies, models, reads, and writes numbers using numerals, words, and expanded notation from hundredths place through one-hundred thousands place**Explanation of Indicator**

Students can use numbers in a variety of situations ranging from reading to writing them from 0.01 to 100,000.

**Instructional Example**

1. Parents can work with finances and have them help with budgeting.
2. Compare total of grocery bills for consecutive weeks to see if special events would cause an increase in costs, such as a family gathering.

**Item Specification Category 1: Memorize Facts/Definitions/Formulas: 1b.** Recall or recognize mathematical terms, definitions, or concepts**Category 2: Perform Procedures: 2a.** Use numbers to count, order, or denote**Category 3: Demonstrate Understanding of Mathematical Ideas: 3b.** Use representations to model mathematical ideas**Category 4: Conjecture/Generalize/Prove: 4f.** Identify faulty arguments or identify misrepresentations of data**Assessment Item Example**

Which shows 23,072 written in expanded notation?

- A.  $20,000 + 3,000 + 700 + 2$
- B.  $2 + 3 + 7 + 2$
- C.  $20,000 + 3,000 + 70 + 2$
- D.  $20 + 3 + 70 + 2$

Correct Answer: C

Indicator					
M.4.1.2.K1					

**Standard/Benchmark/Indicator**

M.4.1.2.K5a-d

**Standard:** Number and Computation**Benchmark:** Number Systems and Their Properties**Indicator:** Uses the concepts of these properties with the whole number system and demonstrates their meaning including the use of concrete objects: a) commutative properties of addition and multiplication; b) zero property of addition (additive identity) and property of one for multiplication (multiplicative identity); c) associative properties of addition and multiplication; d) symmetric property of equality applied to addition and multiplication**Explanation of Indicator**

Numbers can be added or multiplied in any order resulting with the same answer (commutative). When 0 is added to another number it doesn't change the value of the number (identity for addition). When a number is multiplied by 1 it doesn't change the value of the number (identity for multiplication). When a series of numbers is added or multiplied, the order in which the values are added or multiplied doesn't affect the result (associative).

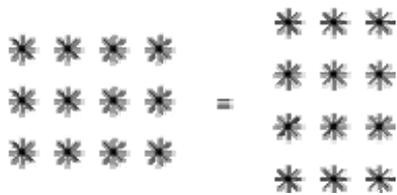
**Instructional Example** Student realizes that the number of forks plus the number of spoons is equal to the number of spoons plus the number of forks. If a parent extends a child's bedtime by 0 minutes, than the child's bedtime doesn't change. If a child has a group of items and the group is multiplied by one, the child still has the same group of items.

**Item Specification**

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

**Assessment Item Example**

The figure shown below represents a number sentence.



Which number sentence BEST describes this figure?

- A.  $3 \times 3 = 3 \times 3$
- B.  $3 \times 4 = 4 \times 3$
- C.  $4 \times 4 = 4 \times 4$
- D.  $5 \times 2 = 2 \times 5$

Correct Answer: B

	Indicator				
	M.4.1.2.K5a-d				

**Standard/Benchmark/Indicator**

M.4.1.4.K6a-d N

Standard: Number and ComputationBenchmark: ComputationIndicator: Shows the relationship between these operations with the basic fact families (addition facts with sums from 0 through 20 and corresponding subtraction facts, multiplication facts from 1 x 1 through 12 x 12 and corresponding division facts) including the use of mathematical models: a) addition and subtraction; b) addition and multiplication; c) multiplication and division; d) subtraction and division**Explanation of Indicator**An example of a fact family is:  $3 \times 5 = 15$ ;  $5 \times 3 = 15$ ;  $15 / 3 = 5$ ;  $15 / 5 = 3$ **Instructional Example**

1. Give the student one member of a fact family, such as  $5 \times 6$ , and ask them to write the other members of this fact family. ( $6 \times 5$ ;  $30/5$ ;  $30/6$ ).
2. Give the student one member of a fact family, such as  $70 / 10$ , ask them to write or state the other members of this fact family.
3. Give the student members of a fact family and one which does not belong and ask which one does not belong. For example ( $8 \times 10$ ;  $10 \times 8$ ;  $80/10$ ;  $10/80$ ;  $80/8$ .)

**Item Specification****Category 1: Memorize Facts/Definitions/Formulas: 1a.** Recite or recall basic mathematics facts**Category 3: Demonstrate Understanding of Mathematical Ideas: 3e.** Show and/or explain relationships between models, diagrams, and/or other representations**Assessment Item Example**Which number sentence comes from the same fact family as  $17-5=12$ ?

- A.  $5 + 7 = 12$
- B.  $5 + 12 = 17$
- C.  $17 - 6 = 11$
- D.  $18 - 6 = 12$

Correct Answer: B

		Indicator			
		M.4.1.4.K6a-d			

**Standard/Benchmark/Indicator**

M.4.2.2.K2a-c

Standard: AlgebraBenchmark: Variables, Equations, and Inequalities

Indicator: Solves one-step equations using whole numbers with one variable and a whole number solution that: a) find the unknown in a multiplication or division equation based on the multiplication facts from  $1 \times 1$  through  $12 \times 12$  and corresponding division facts;  
 b) find the unknown in a money equation using multiplication and division based upon the facts and addition and subtraction with values through \$10; c) find the unknown in a time equation involving whole minutes, hours, days, and weeks with values through 200

**Explanation of Indicator**

Student will solve a problem that requires them to use multiplication or division facts to find an unknown value and problems involving minutes, hours, days, and weeks.

**Instructional Example**

1. If a child is paid \$8 for an allowance for their weekly chores, how many weeks would they need to save to buy an \$80 bicycle?
2. If a movie starts at 7:30 pm and ends at 9:15 pm, how long was the movie?

**Item Specification**

**Category 2: Perform Procedures: 2d.** Solve equations, formulas, or routine word problems

**Assessment Item Example**

The equation below can be used to find the number of nickels ( $y$ ) in \$2.

$$y \text{ nickels} = \$2$$

What is the value of  $y$ ?

- A. 4 nickels
- B. 8 nickels
- C. 20 nickels
- D. 40 nickels

Correct Answer: D

			Indicator		
			M.4.2.2.K2a-c		

**Standard/Benchmark/Indicator**

M.4.2.3.K2

Standard: AlgebraBenchmark: FunctionsIndicator: Finds the values, determines the rule, and states the rule using symbolic notation with one operation of whole numbers from 0 through 200 using a horizontal or vertical function table (input/output machine, T-table)**Explanation of Indicator**

Student can identify and state the rule for a number pattern using (x, ÷, +, -) using a table of values.

**Instructional Example**

If your student is selling cookie dough and the profit is dependent upon the number of tubs sold. What would the rule for the following table be?

1	2	3	4	5
?	10	15	20	25

**Item Specification****Category 3: Demonstrate Understanding of Mathematical Ideas: 3e.** Show and/or explain relationships between models, diagrams, and/or other representations**Category 4: Conjecture/Generalize/Prove: 4d.** Find a mathematical rule to generate a pattern or number sequence**Assessment Item Example**

An input/output table is shown below.

Input	Output
16	4
24	6
20	5
28	7

Which rule is used in the table?

- A.       $\text{output} = \text{Input} \times 4$
- B.       $\text{output} = \text{input} \times 5$
- C.       $\text{output} = \text{Input} + 4$
- D.       $\text{output} = \text{Input} + 5$

Correct Answer: C

				Indicator	
				M.4.2.3.K2	

**Standard/Benchmark/Indicator**

M.4.3.2.K2a-e

Standard: GeometryBenchmark: Measurement and Estimation

Indicator: Selects, explains the selection of, and uses measurement tools, units of measure, and degree of accuracy appropriate for a given situation to measure: a) length, width, and height to the nearest fourth of an inch or to the nearest centimeter; b) volume to the nearest cup, pint, quart, or gallon; to the nearest liter; or to the nearest whole unit of a nonstandard unit; c) weight to the nearest ounce or pound or to the nearest whole unit of a nonstandard unit of measure; d) temperature to the nearest degree; e) time including elapsed time

**Explanation of Indicator**

The student will use a variety of measurement devices such as ruler, yard or meter stick, tape measure, bathroom or food scale, measuring cups, thermometer, stop watch, etc.

**Instructional Example**

A child measures ingredients for recipe, family members height in feet and inches as well as meters and centimeters, and weight of each family member in pounds.

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

**Assessment Item Example**

Sean is weighing his pencil. Which measurement tool should Sean use?

- A. measuring cup
- B. ruler
- C. scale
- D. thermometer

Correct Answer: C

					Indicator
					M.4.3.2.K2a-e

**Standard/Benchmark/Indicator**

M.4.3.3.K2

Standard: GeometryBenchmark: Transformational GeometryIndicator: Recognizes, performs, and describes one transformation (reflection/flip, rotation/turn, translation/slide) on a two-dimensional figure or concrete object.**Explanation of Indicator**

The student will understand, demonstrate, and explain a flip, turn, or slide of an object. Flip is to turn over, turn is to rotate, and slide is to move across a flat surface.

**Instructional Example**

1. The student will help or watch a flip of a pancake
2. The student will turn the doorknob or sit on a sit and spin.
3. The student will slide an object across the floor or table.

**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, **3b.** Use representations to model mathematical ideas

**Assessment Item Example**

The letter B and a line are shown below.



Which statement describes the letter B after a reflection over the line is performed?

- A. The flat side of the B will be on the top.
- B. The B will move to the other side of the line but look the same.
- C. The B will move to the other side of the line and the flat side will be on the right.
- D. The flat side of the B will be on the bottom.

Correct Answer: C

Indicator					
M.4.3.3.K2					

**Standard/Benchmark/Indicator**

M.4.3.4.K3

Standard: GeometryBenchmark: Geometry From An Algebraic PerspectiveIndicator: Identifies and plots points as whole number ordered pairs in the first quadrant of a coordinate plane (coordinate grid)**Explanation of Indicator**

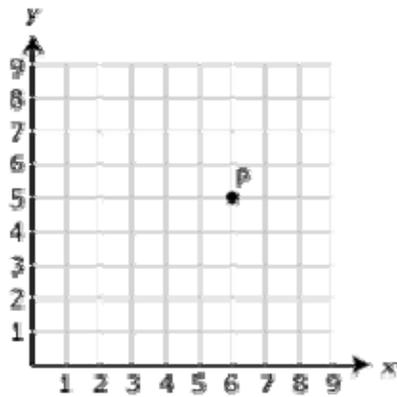
Students will know how to read a grid system to find the position of a location

**Instructional Example**

Child will identify cities on a map.

**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**Category 4: Conjecture/Generalize/Prove: 4f.** Identify faulty arguments or identify misrepresentations of data**Assessment Item Example**

A graph is shown below.



What are the coordinates of point P?

- A. (5, 5)
- B. (5, 6)
- C. (6, 5)
- D. (6, 6)

Correct Answer: C

	Indicator				
	M.4.3.4.K3				

**Standard/Benchmark/Indicator**

M.4.4.2.K1b-i

Standard: DataBenchmark: Statistics

Indicator: Organizes, displays, and reads numerical (quantitative) and non-numerical (qualitative) data in a clear, organized, and accurate manner including a title, labels, categories, and whole number intervals using these data displays: b) pictographs with a symbol or picture representing one, two, five, ten, twenty-five, or one-hundred including partial symbols when the symbol represents an even amount; c) frequency tables (tally marks); d) horizontal and vertical bar graphs; e) Venn diagrams or other pictorial displays; f) line plots; g) charts and tables; h) line graphs; i) circle graphs.

**Explanation of Indicator**

Student will gather information and organize it in a understandable manner using labels and titles for a variety of visual representations such as circle graphs, charts, tables, line graphs, etc.

**Instructional Example**

Child gathers information on what each family member's favorite cookie is and organizes in an appropriate representation with labels and titles.

**Item Specification**

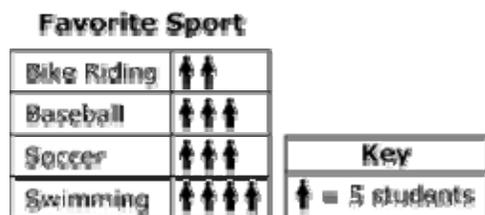
**Category 2: Perform Procedures: 2e.** Organize or display data, **2f.** Read or produce graphs and tables

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

**Category 4: Conjecture/Generalize/Prove: 4f.** Identify faulty arguments or identify misrepresentations of data

**Assessment Item Example**

The table below shows the favorite sports chosen by 60 students at a school.



According to the table, how many MORE students chose swimming than soccer?

- A. 1 student
- B. 5 students
- C. 15 students
- D. 20 students

Correct Answer: B

		Indicator			
		M.4.4.2.K1.b-i			

**Standard/Benchmark/Indicator**

M.4.1.4.A1a-e N

Standard: Number and ComputationBenchmark: ComputationIndicator: Solves one- and two-step real-world problems with one or two operations using these computational procedures: a) adds and subtracts whole numbers from 0 through 10,000 and when used as monetary amounts; b) multiplies through a two-digit whole number by a two-digit whole number; c) multiplies whole dollar monetary amounts (up through three-digit) by a one- or two-digit whole number; d) multiplies monetary amounts less than \$100 by whole numbers less than ten; e) figures correct change through \$20.00**Explanation of Indicator**

Students will solve a variety of problems with money amounts using addition, subtraction and multiplication.

**Instructional Example**

If a gallon of milk costs \$3.12 per gallon and the family uses three gallons a week, how much would be spent on milk in one year.

**Item Specification****Category 2: Perform Procedures: 2d.** Solve equations, formulas, or routine word problems**Category 4: Conjecture/Generalize/Prove: 4f.** Identify faulty arguments or identify misrepresentations of data**Category 5: Solve Non-routine Problems/Make Connections: 5b.** Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals)**Assessment Item Example**

A school is buying 34 new desks for one of its classrooms. The cost of each desk is \$286. What is the TOTAL cost of all 34 desks?

- A. \$2,002
- B. \$6,204
- C. \$8,410
- D. \$9,724

Correct Answer: D

			Indicator		
			M.4.1.4.A1a-e		

**Standard/Benchmark/Indicator**

M.4.2.3.A1

Standard: AlgebraBenchmark: FunctionsIndicator: Represents and describes mathematical relationships between whole numbers from 0 through 1,000 using concrete objects, pictures, written descriptions, symbols, equations, tables, and graphs.**Explanation of Indicator**

The student will create a variety of representations showing relationships between at least two numbers using objects, pictures, words, tables, graphs, etc.

**Instructional Example**

Student rolls two die, for example: 4 and 6, and then writes multiplication equation and draws a description of the equation.

$$4 \times 6 = 24$$

**Item Specification****Category 3: Demonstrate Understanding of Mathematical Ideas: 3e.** Show and/or explain relationships between models, diagrams, and/or other representations**Category 4: Conjecture/Generalize/Prove: 4f.** Identify faulty arguments or identify misrepresentations of data**Category 5: Solve Non-routine Problems/Make Connections: 5b.** Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals)**Assessment Item Example**

Jacob and Eric each had \$30 to spend on school lunches. Jacob spent an equal amount of money each day, and spent all \$30 in 5 days. Eric also spent an equal amount of money each day, but spent all \$30 in 3 days. Which pair of number sentences does NOT show how Jacob and Eric spent their money?

**A**  $30 \div 15 = 2$   
 $30 \div 10 = 3$

**B**  $5 \times 6 = 30$   
 $3 \times 10 = 30$

**C**  $30 \div 5 = 6$   
 $30 \div 3 = 10$

**D**  $6 + 6 + 6 + 6 + 6 = 30$   
 $10 + 10 + 10 = 30$

Correct Answer: A

				Indicator	
				M.4.2.3.A1	

**Standard/Benchmark/Indicator**

M.4.3.1.A2

Standard: GeometryBenchmark: Geometric Figures and Their PropertiesIndicator: Identifies the plane figures (circles, squares, rectangles, triangles, ellipses, rhombi, octagons, hexagons, pentagons, trapezoids) used to form a composite figure**Explanation of Indicator**

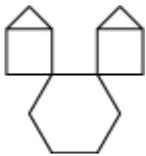
Student identifies a variety of figures from a picture.

**Instructional Example**

Design a figure made from at least three different shapes.

**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**

A figure is shown below.



Which plane shapes were used to form this figure?

- A. octagon, two squares, two triangles
- B. hexagon, two triangles, two squares
- C. pentagon, two squares, two triangles
- D. trapezoid, two triangles, two squares

Correct Answer: B

					Indicator
					M.4.3.1.A2

**Standard/Benchmark/Indicator**

M.4.3.2.A2

Standard: GeometryBenchmark: Measurement and EstimationIndicator: Estimates to check whether or not measurements and calculations for length, width, weight, volume, temperature, time, and perimeter in real-world problems are reasonable**Explanation of Indicator**

Student uses estimation to check if calculations of measurements a reasonable.

**Instructional Example**

Have child figure how much border would be needed for their room and then estimate to check answer

**Item Specification****Category 3: Demonstrate Understanding of Mathematical Ideas: 3a.** Communicate mathematical ideas or rules and/or explain the process**Category 4: Conjecture/Generalize/Prove: 4f.** Identify faulty arguments or identify misrepresentations of data**Category 5: Solve Non-routine Problems/Make Connections: 5b.** Apply mathematics in contexts outside of mathematics (whenever possible, include diagrams/visuals)**Assessment Item Example**

A movie starts at 11:05 a.m. and ends at 1:15 p.m. Which is the most reasonable ESTIMATE of the running time of the movie?

- A. one hour
- B. two hours
- C. three hours
- D. four hours

Correct Answer: B

Indicator					
M.4.3.2.A2					

**Standard/Benchmark/Indicator**

M.4.4.2.A2a-e

Standard: DataBenchmark: Statistics

Indicator: Uses these statistical measures of a data set using whole numbers from 0 through 1,000 with less than ten whole number data points to make reasonable inferences and predictions, answer questions, and make decisions: a) minimum and maximum values; b) range; c) mode; d) median when the data set has an odd number of data points; e) mean when the data set has a whole number mean

**Explanation of Indicator**

Student will find mean, median, mode, and range of a group of two digit numbers.

**Instructional Example**

Child will record the temperature for five consecutive days and use these values to find range, mean, median, and mode.

**Item Specification**

**Category 3: Demonstrate Understanding of Mathematical Ideas: 3c.** Explain findings and/or results from data analysis strategies or experiments/simulations

**Assessment Item Example**

The data set below shows the number of yards a football player kicked a football on seven kicks.

36 11 62 53 49 36 56

What is the RANGE of the data set?

- A. 20
- B. 51
- C. 56
- D. 62

Correct Answer: B

	Indicator				
	M.4.4.2.A2a-e				