

# Math, Grade K (IMRA)

Subject: Mathematics

Grade: KG

Expectations: 36

Breakouts: 127

## (a) Introduction.

1. The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on computational thinking, mathematical fluency, and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.
2. The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, algorithms, paper and pencil, and technology and techniques such as mental math, estimation, number sense, and generalization and abstraction to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, computer programs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
3. For students to become fluent in mathematics, students must develop a robust sense of number. The National Research Council's report, "Adding It Up," defines procedural fluency as "skill in carrying out procedures flexibly, accurately, efficiently, and appropriately." As students develop procedural fluency, they must also realize that true problem solving may take time, effort, and perseverance. Students in Kindergarten are expected to perform their work without the use of calculators.
4. The primary focal areas in Kindergarten are understanding counting and cardinality, understanding addition as joining and subtraction as separating, and comparing objects by measurable attributes.
  - a. Students develop number and operations through several fundamental concepts. Students know number names and the counting sequence. Counting and cardinality lay a solid foundation for number. Students apply the principles of counting to make the connection between numbers and quantities.
  - b. Students use meanings of numbers to create strategies for solving problems and responding to practical situations involving addition and subtraction.
  - c. Students identify characteristics of objects that can be measured and directly compare objects according to these measurable attributes.
5. Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

## (b) Knowledge and Skills Statements

- (1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:
- (A) apply mathematics to problems arising in everyday life, society, and the workplace
    - (i) apply mathematics to problems arising in everyday life
    - (ii) apply mathematics to problems arising in society
    - (iii) apply mathematics to problems arising in the workplace
  - (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
    - (i) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process
    - (ii) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the reasonableness of the solution
  - (C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
    - (i) select tools, including real objects as appropriate, to solve problems
    - (ii) select tools, including manipulatives as appropriate, to solve problems
    - (iii) select tools, including paper and pencil as appropriate, to solve problems
    - (iv) select tools, including technology as appropriate, to solve problems
    - (v) select techniques, including mental math as appropriate, to solve problems
    - (vi) select techniques, including estimation as appropriate, to solve problems
    - (vii) select techniques, including number sense as appropriate, to solve problems
  - (D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
    - (i) communicate mathematical ideas using multiple representations, including symbols as appropriate
    - (ii) communicate mathematical ideas using multiple representations, including diagrams as appropriate
    - (iii) communicate mathematical ideas using multiple representations, including graphs as appropriate
    - (iv) communicate mathematical ideas using multiple representations, including language as appropriate
    - (v) communicate mathematical reasoning using multiple representations, including symbols as appropriate
    - (vi) communicate mathematical reasoning using multiple representations, including diagrams as appropriate
    - (vii) communicate mathematical reasoning using multiple representations, including graphs as appropriate
    - (viii) communicate mathematical reasoning using multiple representations, including language as appropriate
    - (ix) communicate [mathematical ideas'] implications using multiple representations, including symbols as appropriate
    - (x) communicate [mathematical ideas'] implications using multiple representations, including diagrams as appropriate

- (xi) communicate [mathematical ideas'] implications using multiple representations, including graphs as appropriate
- (xii) communicate [mathematical ideas'] implications using multiple representations, including language as appropriate
- (xiii) communicate [mathematical reasoning's] implications using multiple representations, including symbols as appropriate
- (xiv) communicate [mathematical reasoning's] implications using multiple representations, including diagrams as appropriate
- (xv) communicate [mathematical reasoning's] implications using multiple representations, including graphs as appropriate
- (xvi) communicate [mathematical reasoning's] implications using multiple representations, including language as appropriate

(E) create and use representations to organize, record, and communicate mathematical ideas;

- (i) create representations to organize mathematical ideas
- (ii) use representations to organize mathematical ideas
- (iii) create representations to record mathematical ideas
- (iv) use representations to record mathematical ideas
- (v) create representations to communicate mathematical ideas
- (vi) use representations to communicate mathematical ideas

(F) analyze mathematical relationships to connect and communicate mathematical ideas; and

- (i) analyze mathematical relationships to connect mathematical ideas
- (ii) analyze mathematical relationships to communicate mathematical ideas

(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

- (i) display mathematical ideas using precise mathematical language in written or oral communication
- (ii) display mathematical arguments using precise mathematical language in written or oral communication
- (iii) explain mathematical ideas using precise mathematical language in written or oral communication
- (iv) explain mathematical arguments using precise mathematical language in written or oral communication
- (v) justify mathematical ideas using precise mathematical language in written or oral communication
- (vi) justify mathematical arguments using precise mathematical language in written or oral communication

(2) Number and operations. The student applies mathematical process standards to understand how to represent and compare whole numbers, the relative position and magnitude of whole numbers, and relationships within the numeration system. The student is expected to:

(A) count forward and backward to at least 20 with and without objects;

- (i) count forward to at least 20 with objects
- (ii) count forward to at least 20 without objects

- (iii) count backward [from] at least 20 with objects
  - (iv) count backward [from] at least 20 without objects
- (B) read, write, and represent whole numbers from 0 to at least 20 with and without objects or pictures;
- (i) read whole numbers from 0 to at least 20 with objects or pictures
  - (ii) read whole numbers from 0 to at least 20 without objects or pictures
  - (iii) write whole numbers from 0 to at least 20 with objects or pictures
  - (iv) write whole numbers from 0 to at least 20 without objects or pictures
  - (v) represent whole numbers from 0 to at least 20 with objects or pictures
  - (vi) represent whole numbers from 0 to at least 20 without objects or pictures
- (C) count a set of objects up to at least 20 and demonstrate that the last number said tells the number of objects in the set regardless of their arrangement or order;
- (i) count a set of objects up to at least 20
  - (ii) demonstrate that the last number said tells the number of objects in the set regardless of their arrangement or order
- (D) recognize instantly the quantity of a small group of objects in organized and random arrangements;
- (i) recognize instantly the quantity of a small group of objects in organized arrangements
  - (ii) recognize instantly the quantity of a small group of objects in random arrangements
- (E) generate a set using concrete and pictorial models that represents a number that is more than, less than, and equal to a given number up to 20;
- (i) generate a set using concrete models that represents a number that is more than a given number up to 20
  - (ii) generate a set using concrete models that represents a number that is less than a given number up to 20
  - (iii) generate a set using concrete models that represents a number that is equal to a given number up to 20
  - (iv) generate a set using pictorial models that represents a number that is more than a given number up to 20
  - (v) generate a set using pictorial models that represents a number that is less than a given number up to 20
  - (vi) generate a set using pictorial models that represents a number that is equal to a given number up to 20
- (F) generate a number that is one more than or one less than another number up to at least 20;
- (i) generate a number that is one more than or one less than another number up to at least 20
- (G) compare sets of objects up to at least 20 in each set using comparative language;
- (i) compare sets of objects up to at least 20 in each set using comparative language
- (H) use comparative language to describe two numbers up to 20 presented as written numerals; and
- (i) use comparative language to describe two numbers up to 20 presented as written numerals
- (I) compose and decompose numbers up to 10 with objects and pictures.
- (i) compose numbers up to 10 with objects

- (ii) decompose numbers up to 10 with objects
  - (iii) compose numbers up to 10 with pictures
  - (iv) decompose numbers up to 10 with pictures
- (3) Number and operations. The student applies mathematical process standards to develop an understanding of addition and subtraction situations in order to solve problems. The student is expected to:
- (A) model the action of joining to represent addition and the action of separating to represent subtraction;
    - (i) model the action of joining to represent addition
    - (ii) model the action of separating to represent subtraction
  - (B) solve word problems using objects and drawings to find sums up to 10 and differences within 10; and
    - (i) solve word problems using objects to find sums up to 10
    - (ii) solve word problems using objects to find differences within 10
    - (iii) solve word problems using drawings to find sums up to 10
    - (iv) solve word problems using drawings to find differences within 10
  - (C) explain the strategies used to solve problems involving adding and subtracting within 10 using spoken words, concrete and pictorial models, and number sentences.
    - (i) explain the strategies used to solve problems involving adding within 10 using spoken words
    - (ii) explain the strategies used to solve problems involving adding within 10 using concrete models
    - (iii) explain the strategies used to solve problems involving adding within 10 using pictorial models
    - (iv) explain the strategies used to solve problems involving adding within 10 using number sentences
    - (v) explain the strategies used to solve problems involving subtracting within 10 using spoken words
    - (vi) explain the strategies used to solve problems involving subtracting within 10 using concrete models
    - (vii) explain the strategies used to solve problems involving subtracting within 10 using pictorial models
    - (viii) explain the strategies used to solve problems involving subtracting within 10 using number sentences
- (4) Number and operations. The student applies mathematical process standards to identify coins in order to recognize the need for monetary transactions. The student is expected to:
- (A) identify U.S. coins by name, including pennies, nickels, dimes, and quarters.
    - (i) identify U.S. coins by name, including pennies
    - (ii) identify U.S. coins by name, including nickels
    - (iii) identify U.S. coins by name, including dimes
    - (iv) identify U.S. coins by name, including quarters
- (5) Algebraic reasoning. The student applies mathematical process standards to identify the pattern in the number word list. The student is expected to:
- (A) recite numbers up to at least 100 by ones and tens beginning with any given number.
    - (i) recite numbers up to at least 100 by ones beginning with any given number

- (ii) recite numbers up to at least 100 by tens beginning with any given number
- (6) Geometry and measurement. The student applies mathematical process standards to analyze attributes of two-dimensional shapes and three-dimensional solids to develop generalizations about their properties. The student is expected to:
- (A) identify two-dimensional shapes, including circles, triangles, rectangles, and squares as special rectangles;
    - (i) identify two-dimensional shapes, including circles
    - (ii) identify two-dimensional shapes, including triangles
    - (iii) identify two-dimensional shapes, including rectangles
    - (iv) identify two-dimensional shapes, including squares as special rectangles
  - (B) identify three-dimensional solids, including cylinders, cones, spheres, and cubes, in the real world;
    - (i) identify three-dimensional solids, including cylinders, in the real world
    - (ii) identify three-dimensional solids, including cones, in the real world
    - (iii) identify three-dimensional solids, including spheres in the real world
    - (iv) identify three-dimensional solids, including cubes, in the real world
  - (C) identify two-dimensional components of three-dimensional objects;
    - (i) identify two-dimensional components of three-dimensional objects
  - (D) identify attributes of two-dimensional shapes using informal and formal geometric language interchangeably;
    - (i) identify attributes of two-dimensional shapes using informal and formal geometric language interchangeably
  - (E) classify and sort a variety of regular and irregular two- and three-dimensional figures regardless of orientation or size; and
    - (i) classify a variety of regular two-dimensional figures regardless of orientation or size
    - (ii) classify a variety of regular three-dimensional figures regardless of orientation or size
    - (iii) classify a variety of irregular two-dimensional figures regardless of orientation or size
    - (iv) classify a variety of irregular three-dimensional figures regardless of orientation or size
    - (v) sort a variety of regular two-dimensional figures regardless of orientation or size
    - (vi) sort a variety of regular three-dimensional figures regardless of orientation or size
    - (vii) sort a variety of irregular two-dimensional figures regardless of orientation or size
    - (viii) sort a variety of irregular three-dimensional figures regardless of orientation or size
  - (F) create two-dimensional shapes using a variety of materials and drawings.
    - (i) create two-dimensional shapes using a variety of materials
    - (ii) create two-dimensional shapes using drawings
- (7) Geometry and measurement. The student applies mathematical process standards to directly compare measurable attributes. The student is expected to:
- (A) give an example of a measurable attribute of a given object, including length, capacity, and weight; and

- (i) give an example of a measurable attribute of a given object, including length
  - (ii) give an example of a measurable attribute of a given object, including capacity
  - (iii) give an example of a measurable attribute of a given object, including weight
- (B) compare two objects with a common measurable attribute to see which object has more of/less of the attribute and describe the difference.
- (i) compare two objects with a common measurable attribute to see which object has more of/less of the attribute
  - (ii) compare two objects with a common measurable attribute and describe the difference
- (8) Data analysis. The student applies mathematical process standards to collect and organize data to make it useful for interpreting information. The student is expected to:
- (A) collect, sort, and organize data into two or three categories;
    - (i) collect data
    - (ii) sort data into two or three categories
    - (iii) organize data into two or three categories
  - (B) use data to create real-object and picture graphs; and
    - (i) use data to create real-object graphs
    - (ii) use data to create picture graphs
  - (C) draw conclusions from real-object and picture graphs.
    - (i) draw conclusions from real-object picture graphs
    - (ii) draw conclusions from picture graphs
- (9) Personal financial literacy. The student applies mathematical process standards to manage one's financial resources effectively for lifetime financial security. The student is expected to:
- (A) identify ways to earn income;
    - (i) identify ways to earn income
  - (B) differentiate between money received as income and money received as gifts;
    - (i) differentiate between money received as income and money received as gifts
  - (C) list simple skills required for jobs; and
    - (i) list simple skills required for jobs
  - (D) distinguish between wants and needs and identify income as a source to meet one's wants and needs.
    - (i) distinguish between wants and needs
    - (ii) identify income as a source to meet one's wants
    - (iii) identify income as a source to meet one's needs