

Algebraic Reasoning (IMRA)

Subject: Mathematics

Grade: 10

Expectations: 34

Breakouts: 175

(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 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, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, 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.

(B) use a problem- -

- (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) create representations to record mathematical ideas
- (iii) create representations to communicate mathematical ideas
- (iv) use representations to organize mathematical ideas
- (v) use representations to record 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, or 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) Patterns and structure. The student applies mathematical processes to connect finite differences or common ratios to attributes of functions. The student is expected to:

(A) determine the patterns that identify the relationship between a function and its common ratio or related finite differences as appropriate, including linear, quadratic, cubic, and exponential functions;

- (i) determine the patterns that identify the relationship between a function and its common ratio or related finite differences as appropriate, including linear functions
- (ii) determine the patterns that identify the relationship between a function and its common ratio or related finite differences as appropriate, including quadratic functions
- (iii) determine the patterns that identify the relationship between a function and its common ratio or related finite differences as appropriate, including cubic functions
- (iv) determine the patterns that identify the relationship between a function and its common ratio or related finite differences, including exponential functions

(B)

- (xv) compare and contrast the key attributes, including intercepts, of a set of functions, symbolically
- (B) compare and contrast the key attributes of a function and its inverse when it exists, including domain, range, maxima, minima, and intercepts, tabularly, graphically, and symbolically;
 - (i) compare and contrast the key attributes of a function and its inverse when it exists, including domain, tabularly
 - (ii) compare and contrast the key attributes of a function and its inverse when it exists, including domain, graphically
 - (iii) compare and contrast the key attributes of a function and its inverse when it exists, including domain, symbolically
 - (iv) compare and contrast the key attributes of a function and its inverse when it exists, including range, tabularly
 - (v)

- (i) represent a resulting function tabularly when functions, are combined or separated using arithmetic operations
- (ii) $e^{5na04u.5x(e)^3} (15n)^6 aa1.(e)^5 (9/)^{4.6.50} .(e)^5 (8x(c\ 9)^{TT1\ 1\ T00\ Tc\ 0\ Tw\ 0.228\ 0c\ 0.086\ 0\ 2} (of\)^{[1for(7))6\ (a)^{7.9}}$

- (v) compare and contrast the results when multiplying two linear functions that are represented graphically
- (vi) compare and contrast the results when multiplying two linear functions that are represented symbolically

- (i) multiply matrices
- (C) multiply matrices by a scalar;
 - (i) multiply matrices by a scalar

- (iii) compare and contrast between the mathematical and reasonable domain of functions modeling real-world situations, including exponential functions
 - (iv) compare and contrast between the mathematical and reasonable domain of functions modeling real-world situations, including rational functions
 - (v) compare and contrast between the mathematical and reasonable range of functions modeling real-world situations, including linear functions
 - (vi) compare and contrast between the mathematical and reasonable range of functions modeling real-world situations, including quadratic functions
 - (vii) compare and contrast between the mathematical and reasonable range of functions modeling real-world situations, including exponential functions
 - (viii) compare and contrast between the mathematical and reasonable range of functions modeling real-world situations, including rational functions
- (C) determine the accuracy of a prediction from a function that models a set of data compared to the actual data using comparisons between average rates of change and finite differences such as gathering data from an emptying tank and comparing the average rate of change of the volume or the second differences in the volume to key attributes of the given model;
- (i) determine the accuracy of a prediction from a function that models a set of data compared to the actual data using comparisons between average rates of change and finite differences
- (D) determine an appropriate function model, including linear, quadratic, and exponential functions, for a set of data arising from real-world situations using finite differences and average rates of change; and
- (i) determine an appropriate function model, including linear functions, for a set of data arising from real-world situations using finite differences
 - (ii) determine an appropriate function model, including linear functions, for a set of data arising from real-world situations using average rates of change
 - (iii) determine an appropriate function model, including quadratic functions, for a set of data arising from real-world situations using finite differences
 - (iv) determine an appropriate function model, including quadratic functions, for a set of data arising from real-world situations using average rates of change
 - (v) determine an appropriate function model, including exponential functions, for a set of data arising from real-world situations using finite differences
 - (vi) determine an appropriate function model, including exponential functions, for a set of data arising from real-world situations using average rates of change
- (E) determine if a given linear function is a reasonable model for a set of data arising from a real-world situation
- (i) determine if a given linear function is a reasonable model for a set of data arising from a real-world situation