Grade 6: Middle School Advanced Mathematics

Implementation. The provisions of this section may be implemented by school districts beginning with the 2025-2026 school year. A

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Introduction. B

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.** B.1

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.** B.2

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o increase the number of students who complete advanced mathematics courses n high school, the middle school advanced mathematics courses are designed to

enable students to complete Algebra I by the end of Grade 8. B.3

4 **The primary focal areas in Grade 6, Middle School Advanced Mathematics are numeracy; proportionality; expressions, equations, and relationships; and data science. Students use concepts, algorithms, and properties of rational numbers to explore mathematical relationships and to describe increasingly complex situations. Students use concepts of proportionality to explore, develop, and communicate mathematical relationships, including number, geometry and measurement, and statistics. Students use algebraic thinking to describe how a change in one quantity in a relationship results in a change in the other. Students connect verbal, numeric, graphic, and symbolic representations of relationships, including equations and inequalities. Students begin to develop a foundational understanding of functions. Students use geometric properties and relationships, as well as spatial reasoning, to model and analyze situations and solve problems. Students communicate information about geometric figures or situations by quantifying attributes, generalize procedures from measurement experiences, and use the procedures to solve problems. Students use appropriate statistics, representations of data, and reasoning to draw conclusions, evaluate arguments, and make recommendations. The use of technology, including graphing tools, is essential in middle school advanced mathematics courses to master algebra readiness skills by bridging conceptual understanding and procedural fluency.** B.4

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.5

Knowledge and skills. C

1 **Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:** C.1

A apply mathematics to problems arising in everyday life, society, and the workplace; C.1.A

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; C.1.B

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; C.1.C

D communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate; C.1.D

E create and use representations to organize, record, and communicate mathematical ideas; C.1.E

F analyze mathematical relationships to connect and communicate mathematical ideas; and C.1.F

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G display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. C.1.G

2 **Numeracy--foundations of rational numbers. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to:** C.2

A classify sets and subsets using a visual representation such as a Venn diagram or a hierarchy to describe relationships between sets of rational numbers; C.2.A

B identify a number, its opposite, and its absolute value; C.2.B

C represent benchmark fractions and percents such as 1%, 10%, 25%, 33 1/3%, and multiples of these values using 10 by 10 grids, strip diagrams, number lines, and numbers as proportional relationships; C.2.C

D generate equivalent forms of fractions, decimals, and percents using real-world problems as proportional relationships, including problems that involve money; C.2.D

E use equivalent fractions, decimals, and percents to show equal parts of the same whole as proportional relationships; C.2.E

F locate, compare, and order integers and rational numbers using a number line; C.2.F

G order a set of rational numbers arising from mathematical and real-world contexts; and C.2.G

H use coordinate geometry to identify locations on a plane, including graphing points in all four quadrants using ordered pairs of rational numbers. C.2.H

3 **Numeracy--operations with rational numbers. The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions. The student is expected to:** C.3

A recognize that dividing by a rational number and multiplying by its reciprocal result in equivalent values; C.3.A

B determine, with and without computation, whether a quantity is increased or decreased when multiplied by a fraction, including values greater than or less than one; C.3.B

C extend representations for division to include fraction notation such as a/b represents the same number as a ÷b where b ≠ 0; C.3.C

D represent integer operations with concrete models and connect the actions with the models to standardized algorithms; C.3.D

E add, subtract, multiply, and divide integers fluently; C.3.E

F add, subtract, multiply, and divide rational numbers; C.3.F

G generate equivalent numerical expressions using order of operations, including whole number exponents and prime factorization; C.3.G

I balance a check register that includes deposits, withdrawals, and transfers; and C.3.H

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I create and organize a financial assets and liabilities record and construct a net worth statement. C.3.I

4 **Numeracy--applications of percents. The student applies mathematical process standards to solve problems involving percents as proportional relationships. The student is expected to:** C.4

A solve real-world problems to find the whole given a part and the percent, to find the part given the whole and the percent, and to find the percent given the part and the whole, including the use of concrete and pictorial models; and C.4.A

B calculate the sales tax for a given purchase and calculate income tax for earned wages. C.4.B

5 **Proportionality--foundations of ratios and rates. The student applies mathematical process standards to develop an understanding of proportional relationships in problem situations. The student is expected to:** C.5

A give examples of ratios as multiplicative comparisons of two quantities describing the same attribute; C.5.A

B give examples of rates as the comparison by division of two quantities having different attributes, including rates as quotients; C.5.B

C represent ratios and percents with concrete models, fractions, and decimals; and C.5.C

D represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions. C.5.D

6 **Proportionality--applications of ratios and rates. The student applies mathematical process standards to solve problems involving proportional relationships. The student is expected to:** C.6

A apply qualitative and quantitative reasoning to solve prediction and comparison of real-world problems involving ratios and rates; C.6.A

B calculate unit rates from rates in mathematical and real-world problems; and C.6.B

C convert within and between measurement systems, including the use of proportions and the use of unit rates. C.6.C

7 **One-variable expressions, equations, and relationships--foundations of one-variable relationships. The student applies mathematical process standards to develop concepts of expressions and equations. The student is expected to:** C.7

A distinguish between expressions and equations verbally, numerically, and algebraically; C.7.A

B determine if two expressions are equivalent using concrete models, pictorial models, and algebraic representations; and C.7.B

C generate equivalent expressions using the properties of operations: inverse, identity, commutative, associative, and distributive properties. C.7.C

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)ne-variable expressions, equations, and relationships--applications of one-variable relationships. The student applies mathematical process standards to use

equations and inequalities to represent situations and solve problems. The student is expected to: C.8

- A write one-variable, one- and two-step equations and inequalities to represent constraints or conditions within problems; C.8.A
- B write corresponding real-world problems given one-variable, one- and two-step equations or inequalities; C.8.B
- C represent solutions for one-variable, one- and two-step equations and inequalities on number lines; C.8.C
- D model and solve one-variable, one-step equations and inequalities that represent problems, including geometric concepts; C.8.D
- E model and solve one-variable, two-step equations and inequalities; and C.8.E
- F determine if the given value(s) make(s) one-variable, one- and two-step equations and inequalities true. C.8.F

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9 Two-variable equations and relationships--foundations of linear relationships. The student applies mathematical process standards to use multiple representations to describe algebraic relationships. The student is expected to: C.9

- A identify independent and dependent quantities from tables and graphs; C.9.A
- B write an equation that represents the relationship between independent and dependent quantities from a table; C.9.B
- C represent a given situation using verbal descriptions, tables, graphs, and equations in the form y = kx or y = x + b; and C.9.C
- D compare two rules verbally, numerically, graphically, and symbolically in the form of y = ax or y = x + a in order to differentiate between additive and multiplicative relationships. C.9.D

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10 Two-variable equations and relationships--applications of proportional relationships. The student applies mathematical process standards to represent and solve problems involving proportional relationships. The student is expected to represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt. C.10

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11 Geometric expressions, equations, and relationships--foundations of geometric concepts equations. The student applies mathematical process standards to use geometry to represent relationships. The student is expected to: C.11

- A model area formulas for parallelograms, trapezoids, and triangles by decomposing and rearranging parts of these shapes; and C.11.A
- B write equations that represent problems related to the area of rectangles, parallelograms, trapezoids, and triangles and volume of right rectangular prisms where dimensions are positive rational numbers. C.11.B

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12 **Geometric expressions, equations, and relationships--applications of geometric concepts. The student applies mathematical process standards to use geometry to represent relationships and solve problems. The student is expected to:** C.12

A extend previous knowledge of triangles and their properties to include the sum of angles of a triangle, the relationship between the lengths of sides and measures of angles in a triangle, and determining when three lengths form a triangle; C.12.A

B determine solutions for problems involving the area of rectangles, parallelograms, trapezoids, and triangles where dimensions are positive rational numbers; C.12.B

C solve problems involving the volume of right rectangular prisms and triangular prisms; and C.12.C

D write and solve equations using geometry concepts, including the sum of the angles in a triangle, and angle relationships. C.12.D

13 **Data science--foundations of measurement and data. The student applies mathematical process standards to represent and analyze data. The student is expected to:** C.13

A distinguish between situations that yield data with and without variability; and C.13.A

B represent numeric data graphically, including dot plots, stem-and-leaf plots, histograms, and box plots. C.13.B

14 **Data science--applications of measurement and data. The student applies mathematical process standards to use numerical or graphical representations to analyze and solve problems. The student is expected to:** C.14

A use the graphical representation of numeric data to describe the center, spread, and shape of the data distribution; C.14.A

B summarize numeric data with numerical summaries, including the mean and median (measures of center) and the range and interquartile range (IQR) (measures of spread), and use these summaries to describe the center, spread, and shape of the data distribution; C.14.B

C interpret numeric data summarized in dot plots, stem-and-leaf plots, histograms, and box plots; C.14.C

D solve problems using data represented in bar graphs, dot plots, and circle graphs, including part-to-whole and part-to-part comparisons and equivalents; C.14.D

E compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads; and C.14.E

F summarize categorical data with numerical and graphical summaries, including the mode, the percent of values in each category (relative frequency table), and the percent bar graph, and use these summaries to describe the data distribution. C.14.F

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Personal financial literacy--money management. The student applies mathematical process standards to develop an economic way of thinking and

problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to: C.15

A compare the features and costs of a checking account and a debit card offered by different local financial institutions; C.15.A

B identify and explain the advantages and disadvantages of different payment methods, including distinguishing between debit cards and credit cards; C.15.B

C explain why it is important to establish a positive credit history; C.15.C

D describe the information in a credit report and how long it is retained; C.15.D

E describe the value of credit reports to borrowers and to lenders; C.15.E

F explain various methods to pay for college, including through savings, grants, scholarships, student loans, and work-study; and C.15.F

G compare the annual salary of several occupations requiring various levels of post-secondary education or vocational training and calculate the effects of the different annual salaries on lifetime income. C.15.G