Texas Assessment of Knowledge and Skills - Modified
Answer Key

Grade: 09
Subject: Mathematics
Administration: April 2009

The letter **A** indicates that the student expectation listed is from the Algebra I TEKS.

Item Number	Correct Answer	Objective Measured	Student Expectations
01	C	04	A.7 (C)
02	G	01	A.1 (D)
03	C	02	A.4 (A)
04	G	02	A.3 (A)
05	B	04	A.7 (A)
06	F	10	8.14 (C)
07	B	03	A.6 (C)
08	H	09	8.12 (A)
09	B	08	8.9 (A)
10	F	01	A.1 (C)
11	C	02	A.2 (B)
12	F	05	A.9 (C)
13	C	01	A.1 (D)
14	H	09	8.13 (B)
15	A	08	8.9 (B)
16	H	03	A.6 (E)
17	B	01	A.1 (B)
18	G	10	8.15 (A)
19	C	06	8.7 (D)
20	H	09	8.11 (B)
21	B	09	8.3 (B)
22	H	08	8.8 (A)
23	A	04	A.7 (A)
24	H	06	8.6 (A)
25	B	02	A.4 (B)
26	H	10	8.16 (A)
27	C	03	A.5 (C)
28	F	08	8.10 (A)
29	C	10	8.16 (A)
30	F	03	A.6 (D)
31	B	07	8.7 (B)
32	F	01	A.1 (E)
33	A	06	8.6 (B)
34	G	07	8.7 (C)
35	A	08	8.8 (C)
36	H	05	A.11 (A)
37	A	04	A.8 (A)
38	F	10	8.16 (B)
39	C	07	8.7 (A)
40	G	10	8.15 (A)
41	C	10	8.14 (A)
42	G	05	A.9 (C)

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Grade 9 Mathematics

For a more complete description of the objectives measured, please refer to the Revised TAKS Information Booklet for Grade 9 Mathematics at http://www.tea.state.tx.us/student.assessment/taks/booklets/index.html.

Objective 1: The student will describe functional relationships in a variety of ways.

(A.1) **Foundations for functions.** The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. The student is expected to

(A) describe independent and dependent quantities in functional relationships;

(B) [gather and record data and] use data sets to determine functional relationships between quantities;

(C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;

(D) represent relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and

(E) interpret and make decisions, predictions, and critical judgments from functional relationships.

Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.

(A.2) **Foundations for functions.** The student uses the properties and attributes of functions. The student is expected to

(A) identify [and sketch] the general forms of linear ($y = x$) and quadratic ($y = x^2$) parent functions;

(B) identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete;

(C) interpret situations in terms of given graphs [or create situations that fit given graphs]; and

(D) [collect and] organize data, [make and] interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.

(A.3) **Foundations for functions.** The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. The student is expected to

(A) use symbols to represent unknowns and variables; and

(B) look for patterns and represent generalizations algebraically.

(A.4) **Foundations for functions.** The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to

(A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations;

(B) use the commutative, associative, and distributive properties to simplify algebraic expressions; and

(C) connect equation notation with function notation, such as $y = x + 1$ and $f(x) = x + 1$.

Objective 3: The student will demonstrate an understanding of linear functions.

(A.5) **Linear functions.** The student understands that linear functions can be represented in different ways and translates among their various representations. The student is expected to

(A) determine whether or not given situations can be represented by linear functions; and

(C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions.

(A.6) **Linear functions.** The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations. The student is expected to

(A) develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;

(B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;

(C) investigate, describe, and predict the effects of changes in m and b on the graph of $y = mx + b$;

(D) graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept;

(E) determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;

(F) interpret and predict the effects of changing slope and y-intercept in applied situations; and

(G) relate direct variation to linear functions and solve problems involving proportional change.

Objective 4: The student will formulate and use linear equations and inequalities.

(A.7) **Linear functions.** The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to

(A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;

(B) investigate methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and

(C) interpret and determine the reasonableness of solutions to linear equations and inequalities.

(A.8) **Linear functions.** The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to

(A) analyze situations and formulate systems of linear equations in two unknowns to solve problems.

Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions.

(A.9) **Quadratic and other nonlinear functions.** The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions. The student is expected to

(C) investigate, describe, and predict the effects of changes in c on the graph of $y = ax^2 + c$.

(A.11) **Quadratic and other nonlinear functions.** The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. The student is expected to

(A) use [patterns to generate] the laws of exponents and apply them in problem-solving situations.

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

(8.6) **Geometry and spatial reasoning.** The student uses transformational geometry to develop spatial sense. The student is expected to

(A) generate similar figures using dilations including enlargements and reductions; and

(B) graph dilations, reflections, and translations on a coordinate plane.

(8.7) **Geometry and spatial reasoning.** The student uses geometry to model and describe the physical world. The student is expected to

(D) locate and name points on a coordinate plane using ordered pairs of rational numbers.

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

(8.7) **Geometry and spatial reasoning.** The student uses geometry to model and describe the physical world. The student is expected to

(A) draw three-dimensional figures from different perspectives;

(B) use geometric concepts and properties to solve problems in fields such as art and architecture; and

(C) use pictures or models to demonstrate the Pythagorean Theorem.

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

(8.8) **Measurement.** The student uses procedures to determine measures of three-dimensional figures. The student is expected to

(A) find lateral and total surface area of prisms, pyramids, and cylinders using [concrete] models and nets (two-dimensional models);

(B) connect models of prisms, cylinders, pyramids, spheres, and cones to formulas for volume of these objects; and

(C) estimate measurements and use formulas to solve application problems involving lateral and total surface area and volume.

(8.9) **Measurement.** The student uses indirect measurement to solve problems. The student is expected to

(A) use the Pythagorean Theorem to solve real-life problems; and

(B) use proportional relationships in similar two-dimensional figures or similar three-dimensional figures to find missing measurements.

(8.10) **Measurement.** The student describes how changes in dimensions affect linear, area, and volume measures. The student is expected to

(A) describe the resulting effects on perimeter and area when dimensions of a shape are changed proportionally; and

(B) describe the resulting effect on volume when dimensions of a solid are changed proportionally.

Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.

(8.1) **Number, operation, and quantitative reasoning.** The student understands that different forms of numbers are appropriate for different situations. The student is expected to

(B) select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships.

(8.3) **Patterns, relationships, and algebraic thinking.** The student identifies proportional or non-proportional linear relationships in problem situations and solves problems. The student is expected to

(B) estimate and find solutions to application problems involving percents and other proportional relationships such as similarity and rates.

(8.11) **Probability and statistics.** The student applies concepts of theoretical and experimental probability to make predictions. The student is expected to

(A) find the probabilities of dependent and independent events; and

(B) use theoretical probabilities and experimental results to make predictions and decisions.

(8.12) **Probability and statistics.** The student uses statistical procedures to describe data. The student is expected to

(A) select the appropriate measure of central tendency or range to describe a set of data and justify the choice for a particular situation; and

(C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, [stem and leaf plots,] circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology.

(8.13) **Probability and statistics.** The student evaluates predictions and conclusions based on statistical data. The student is expected to

(B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis.

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.14) **Underlying processes and mathematical tools.** The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to

(A) identify and apply mathematics to everyday experiences, to activities in and outside of school, with other disciplines, and with other mathematical topics;

(B) use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness; and

(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.

(8.15) **Underlying processes and mathematical tools.** The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models. The student is expected to

(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models.

(8.16) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to

(A) make conjectures from patterns or sets of examples and nonexamples; and

(B) validate his/her conclusions using mathematical properties and relationships.