# Texas Assessment of Knowledge and Skills - Answer Key

**Grade: 11**
**Subject: Mathematics**
**Administration: Spring 2003**

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

The letter **G** indicates that the student expectation listed is from the Geometry TEKS.

| Item Number | Correct Answer | Objective Measured | Student Expectations |
|---|---|---|---|
| 01 | B | 07 | G.D1 (B) |
| 02 | G | 06 | G.C1 (A) |
| 03 | D | 04 | A.C4 (A) |
| 04 | H | 05 | A.D1 (C) |
| 05 | C | 09 | 8.12 (C) |
| 06 | J | 07 | G.D2 (B) |
| 07 | A | 10 | 8.14 (C) |
| 08 | H | 09 | 8.12 (A) |
| 09 | C | 08 | G.E1 (A) |
| 10 | G | 10 | 8.14 (A) |
| 11 | B | 01 | A.B1 (C) |
| 12 | F | 10 | 8.15 (A) |
| 13 | B | 08 | G.F1 (A) |
| 14 | H | 07 | G.E2 (D) |
| 15 | B | 05 | A.D2 (B) |
| 16 | F | 03 | A.C1 (C) |
| 17 | C | 10 | 8.14 (B) |
| 18 | G | 09 | 8.3 (B) |
| 19 | A | 07 | G.D2 (C) |
| 20 | G | 06 | G.C1 (C) |
| 21 | 4 | 02 | A.B4 (A) |
| 22 | G | 10 | 8.15 (A) |
| 23 | C | 04 | A.C3 (C) |
| 24 | G | 06 | G.B4 (A) |
| 25 | D | 02 | A.B4 (B) |
| 26 | F | 09 | 8.11 (B) |
| 27 | D | 06 | G.E3 (A) |
| 28 | G | 01 | A.B1 (B) |
| 29 | A | 03 | A.C2 (C) |
| 30 | H | 06 | G.C1 (C) |
| 31 | D | 10 | 8.15 (A) |
| 32 | F | 08 | G.F1 (A) |
| 33 | A | 08 | G.F1 (D) |
| 34 | J | 06 | G.C1 (A) |
| 35 | C | 04 | A.C3 (B) |
| 36 | F | 07 | G.D2 (B) |
| 37 | A | 02 | A.B2 (C) |
| 38 | H | 09 | 8.13 (B) |
| 39 | D | 08 | G.F1 (B) |
| 40 | H | 10 | 8.14 (A) |
| 41 | B | 08 | G.E1 (C) |
| 42 | H | 08 | G.E1 (D) |
| 43 | C | 03 | A.C2 (B) |
| 44 | G | 07 | G.D1 (C) |
| 45 | D | 01 | A.B1 (B) |
| 46 | G | 04 | A.C4 (B) |
| 47 | C | 05 | A.D2 (A) |
| 48 | F | 05 | A.D3 (A) |
| 49 | B | 05 | A.D1 (B) |
| 50 | G | 01 | A.B1 (D) |
| 51 | A | 06 | G.B4 (A) |
| 52 | G | 10 | 8.16 (B) |
| 53 | C | 03 | A.C2 (E) |
| 54 | G | 02 | A.B3 (B) |
| 55 | C | 10 | 8.16 (A) |
| 56 | H | 04 | A.C3 (A) |
| 57 | B | 03 | A.C2 (A) |
| 58 | G | 07 | G.D2 (A) |
| 59 | A | 01 | A.B1 (E) |
| 60 | J | 02 | A.B2 (D) |

# Grade 11 Mathematics

Refer to the *TAKS Information Booklet* <u>Mathematics Grades 8-11</u> for a more complete description of the objectives measured.


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

A(b)(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.

   (A)   The student describes independent and dependent quantities in functional relationships.

   (B)   The student [gathers and record data, or] uses data sets, to determine functional (systematic) relationships between quantities.

   (C)   The student describes functional relationships for given problem situations and writes equations or inequalities to answer questions arising from the situations.

   (D)   The student represents relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities.

   (E)   The student interprets and makes inferences from functional relationships.


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

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

   (A)   The student identifies [and sketches] the general forms of linear ( $y = x$) and quadratic ( $y = x^2$) parent functions.

   (B)   For a variety of situations, the student identifies the mathematical domains and ranges and determines reasonable domain and range values for given situations.

   (C)   The student interprets situations in terms of given graphs [or creates situations that fit given graphs].

   (D)   In solving problems, the student [collects and] organizes data, [makes and] interprets scatterplots, and models, predicts, and makes decisions and critical judgments.

A(b)(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.

   (A)   The student uses symbols to represent unknowns and variables.

   (B)   Given situations, the student looks for patterns and represents generalizations algebraically.

A(b)(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.

   (A)   The student finds specific function values, simplifies polynomial expressions, transforms and solves equations, and factors as necessary in problem situations.

(B)   The student uses the commutative, associative, and distributive properties to simplify algebraic expressions.

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

A(c)(1) **Linear functions.** The student understands that linear functions can be represented in different ways and translates among their various representations.

(A)   The student determines whether or not given situations can be presented by linear functions.

(C)   The student translates among and uses algebraic, tabular, graphical, or verbal descriptions of linear functions.

A(c)(2) **Linear Functions.** The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

(A)   The student develops the concepts of slope as a rate of change and determines slopes from graphs, tables, and algebraic expressions.

(B)   The student interprets the meaning of slope and intercepts in situations using data, symbolic representations, or graphs.

(C)   The student investigates, describes, and predicts the effects of changes in $m$ and $b$ on the graph of $y = mx + b$.

(D)   The student graphs and writes equations of lines given characteristics such as two points, a point and a slope, or a slope and $y$-intercept.

(E)   The student determines the intercepts of linear functions from graphs, tables, and algebraic representations.

(F)   The student interprets and predicts the effects of changing slope and $y$-intercept in applied situations.

(G)   The student relates direct variation to linear functions and solves problems involving proportional change.

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

A(c)(3) **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.

(A)   The student analyzes situations involving linear functions and formulates linear equations or inequalities to solve problems.

(B)   The student investigates methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, selects a method, and solves the equations and inequalities.

(C)   For given contexts, the student interprets and determines the reasonableness of solutions to linear equations and inequalities.

A(c)(4) **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.

   (A)   The student analyzes situations and formulates systems of linear equations to solve problems.

   (B)   The student solves systems of linear equations using [concrete] models, graphs, tables, and algebraic methods.

   (C)   For given contexts, the student interprets and determines the reasonableness of solutions to systems of linear equations.

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

A(d)(1) **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.

   (B)   The student investigates, describes, and predicts the effects of changes in $a$ on the graph of $y = ax^2$.

   (C)   The student investigates, describes, and predicts the effects of changes in $c$ on the graph of $y = x^2 + c$.

   (D)   For problem situations, the student analyzes graphs of quadratic functions and draws conclusions.

A(d)(2) **Quadratic and other nonlinear functions.**  The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.

   (A)   The student solves quadratic equations using [concrete] models, tables, graphs, and algebraic methods.

   (B)   The student relates the solutions of quadratic equations to the roots of their functions.

A(d)(3) **Quadratic and other nonlinear functions.**  The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations.

   (A)   The student uses [patterns to generate] the laws of exponents and applies them in problem-solving situations.

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

G(b)(4) **Geometric structure.** The student uses a variety of representations to describe geometric relationships and solve problems.

   (A)   The student selects an appropriate representation ([concrete,] pictorial, graphical, verbal, or symbolic) in order to solve problems.

G(c)(1) **Geometric patterns.** The student identifies, analyzes, and describes patterns that emerge from two- and three-dimensional geometric figures.

    (A)   The student uses numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles.

    (B)   The student uses the properties of transformations and their compositions to make connections between mathematics and the real world in applications such as tessellations or fractals.

    (C)   The student identifies and applies patterns from right triangles to solve problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.

G(e)(3) **Congruence and the geometry of size.** The student applies the concept of congruence to justify properties of figures and solve problems.

    (A)   The student uses congruence transformations to make conjectures and justify properties of geometric figures.

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

G(d)(1) **Dimensionality and the geometry of location.** The student analyzes the relationship between three-dimensional objects and related two-dimensional representations and uses these representations to solve problems.

    (B)   The student uses nets to represent [and construct] three-dimensional objects.

    (C)   The student uses top, front, side, and corner views of three-dimensional objects to create accurate and complete representations and solve problems.

G(d)(2) **Dimensionality and the geometry of location.** The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

    (A)   The student uses one- and two-dimensional coordinate systems to represent points, lines, line segments, and figures.

    (B)   The student uses slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and [special segments of] triangles and other polygons.

    (C)   The student [develops and] uses formulas including distance and midpoint.

G(e)(2) **Congruence and the geometry of size.** The student analyzes properties and describes relationships in geometric figures.

    (D)   The student analyzes the characteristics of three-dimensional figures and their component parts.

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

G(e)(1) **Congruence and the geometry of size.**  The student extends measurement concepts to find area, perimeter, and volume in problem situations.

    (A)   The student finds area of polygons and composite figures.

    (B)   The student finds areas of sectors and arc lengths of circles using proportional reasoning.

    (C)   The student [develops, extends and] uses the Pythagorean Theorem.

    (D)   The student finds surface area and volumes of prisms, pyramids, spheres, cones, and cylinders in problem situations.

G(f)(1) **Similarity and the geometry of shape.**  The student applies the concepts of similarity to justify properties of figures and solve problems.

    (A)   The student uses similarity properties and transformations to [explore and] justify conjectures about geometric figures.

    (B)   The student uses ratios to solve problems involving similar figures.

    (C)   In a variety of ways, the student [develops,] applies, and justifies triangle similarity relationships, such as right triangle ratios, [trigonometric ratios,] and Pythagorean triples.

    (D)   The student describes the effect on perimeter, area, and volume when length, width, or height of a three-dimensional solid is changed and applies this idea in solving problems.


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

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

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

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

    (A)   find the probabilities of compound events (dependent and independent); 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 to describe a set of data for a particular purpose; and

    (C)   construct circle graphs, bar graphs, and histograms, with and without 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.