# **Algebra 1 Unit Test Guide**

## Function Analysis Unit Test

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| **Item** | **Lesson Coverage** | **Objective** | **Mathematical Practice Standard** | **Assessment Item** |
| 1 | Lesson 2: Piecewise Linear Functions | In this section, you will graph piecewise linear functions given equations. | Model with mathematics. | Is this the correct graph for the piecewise function:    Correct Answer: 1 for yes  [Function Analysis Unit Test Item #1 | Desmos](https://www.desmos.com/calculator/9bdurwktt6)  [Function Analysis Unit Test Item #1 - GeoGebra](https://www.geogebra.org/calculator/vafj9ugs) |
| 2 | Lesson 2: Piecewise Linear Functions | In this section, you will write equations of piecewise linear functions from graphs. | Model with mathematics. | What is the piecewise function for the graph?    Correct Answer: Option #2  [Function Analysis Unit Test Item #2 | Desmos](https://www.desmos.com/calculator/rlzirubbwr)  [Function Analysis Unit Test Item #2 - GeoGebra](https://www.geogebra.org/calculator/yzayqyk9) |
| 3 | Lesson 3: Quadratic Functions in Vertex Form | In this section, you will graph quadratics given in vertex form. | Model with mathematics. | What is the vertex form of the graphed equation?  Correct Answer: -3, -1  [Function Analysis Unit Test Item #3 | Desmos](https://www.desmos.com/calculator/npmfvdnskm)  [Function Analysis Unit Test Item #3 - GeoGebra](https://www.geogebra.org/graphing/a3u5nnn2) |
| 4 | Lesson 3: Quadratic Functions in Vertex Form | In this section, you will write equations of quadratics in vertex form given a graph. | Model with mathematics. | Use the graph to write the equation of the quadratic function in vertex form.    Correct Answer: 3, 2  [Function Analysis Unit Test Item #4 | Desmos](https://www.desmos.com/calculator/4zr3pxettu)  [Function Analysis Unit Test Item #4 - GeoGebra](https://www.geogebra.org/calculator/f5ragvf4) |
| 5 | Lesson 4: Quadratic Functions in Standard Form | In this section, you will graph quadratic functions given in standard form. | Model with mathematics. | A soccer ball is kicked from the ground at an upward velocity of 25 feet per second. This situation can be represented by the function . Graph the function. Identify the x-intercept(s) and interpret its meaning.    Correct Answer: (1.563, 0) The soccer ball will return to the ground 1.563 seconds after it has been kicked.  [Function Analysis Unit Test Item #5 | Desmos](https://www.desmos.com/calculator/t1lpldcbzu)  [Function Analysis Unit Test Item #5 - GeoGebra](https://www.geogebra.org/calculator/d5ehwczt) |
| 6 | Lesson 4: Quadratic Functions in Standard Form | In this section, you will write quadratic equations in standard form given a graph. | Model with mathematics. | Determine the value of the constant term of the quadratic function in standard form, given its graph.  The value of c in the standard form of the quadratic function is \_\_\_\_.  Correct Answer: 6  [Function Analysis Unit Test Item #6 | Desmos](https://www.desmos.com/calculator/rkctodeg9u)  [Function Analysis Unit Test Item #6 - GeoGebra](https://www.geogebra.org/calculator/y3rmkzud) |
| 7 | Lesson 5: Exponential Functions | In this section, you will graph exponential functions given equations. | Model with mathematics. | The function models the number of people who have watched a video after *t* days. Graph the function to determine how many people initially watched the video by finding the y-intercept.  Correct Answer: 4 people  [Function Analysis Unit Test Item #7 | Desmos](https://www.desmos.com/calculator/gqqxgfsch5)  [Function Analysis Unit Test Item #7 - GeoGebra](https://www.geogebra.org/calculator/whwyqmfz) |
| 8 | Lesson 5: Exponential Functions | In this section, you will write equations for exponential functions given a graph. | Model with mathematics. | Given the graph of the exponential equation, which option is the correct exponential equation for the graph?  Option #1:  Option #2:  Option #3:  Option #4:  Correct Answer: Option #2 is the correct equation for the graph.  [Function Analysis Unit Test Item #8 | Desmos](https://www.desmos.com/calculator/4gsygo0hsl)  [Function Analysis Unit Test #8 - GeoGebra](https://www.geogebra.org/calculator/eah2pnqa) |
| 9 | Lesson 6: Square Root Functions | In this section, you will graph square root functions given equations. | Model with mathematics. | Graph the square root functions and . Which function has a y-intercept? Enter the correct option number.  Option 1:  Option 2:  Option 3: both  Correct Answer: Option 2  [Function Analysis Unit Test Item #9 | Desmos](https://www.desmos.com/calculator/jpgxuylrta)  [Function Analysis Unit Test Item #9 - GeoGebra](https://www.geogebra.org/calculator/byyyabzv) |
| 10 | Lesson 6: Square Root Functions | In this section, you will identify key features of square root functions from graphs and compare with related quadratic functions. | Model with mathematics. | What are the coordinates of the minimum point for the square root function that relates to the quadratic function  Correct Answer: (4, 11)  [Function Analysis Unit Test Item #10 | Desmos](https://www.desmos.com/calculator/2usmlzvajz)  [Function Analysis Unit Test Item #10 - GeoGebra](https://www.geogebra.org/calculator/jrhpvepb) |
| 11 | Lesson 7: Cube Root Functions | In this section, you will graph cube root functions given equations. | Model with mathematics. | Does the graph of the function show that the function is increasing or decreasing?  Option 1: increasing  Option 2: decreasing  Correct Answer: Option 1  [Function Analysis Unit Test Item #11 | Desmos](https://www.desmos.com/calculator/co81jvwpy8)  [Function Analysis Unit Test Item #11 - GeoGebra](https://www.geogebra.org/calculator/xanzs9zh) |
| 12 | Lesson 7: Cube Root Functions | In this section, you will identify key features from the graph of a cube root function and compare them to the features of the graph of a square root function. | Model with mathematics. | Compare the graphs of and . What is the y-intercept of both graphs?  Correct Answer: 2  [Function Analysis Unit Test Item #12 | Desmos](https://www.desmos.com/calculator/rwmmek2mh1)  [Function Analysis Unit Test Item #12 - GeoGebra](https://www.geogebra.org/calculator/mv89gseh) |
| 13 | Lesson 8: Comparing Shapes of Functions | In this section, you will compare the shapes of linear, quadratic, exponential, and cubic functions. | Model with mathematics. | |  |  |  | | --- | --- | --- | |  |  |  | | -2 | -1 | 3 | | -1 |  |  | | 0 | 1 | 0 | | 1 |  |  | | 2 | 3 | 3 |   Compare the functions and . When is greater than ?  is greater than when \_\_\_\_\_\_\_\_\_\_.  Correct Answer: -1, 2  [Function Analysis Unit Test Item #13 | Desmos](https://www.desmos.com/calculator/6dcvuep4oq)  [Function Analysis Unit Tet Item #13 - GeoGebra](https://www.geogebra.org/calculator/wrhbfuc3) |
| 14 | Lesson 8: Comparing Shapes of Functions | In this lesson, you will compare the shapes of square root and cube root graphs. | Model with mathematics. | Select the option that matches the graph.  Option #1: The graph of the function matches  Option #2: The graph of the function matches  Correct Answer: Option #2  [Function Analysis Unit Test Item #14 | Desmos](https://www.desmos.com/calculator/agxa9togwy)  [Function Analysis Unit Test Item #14 - GeoGebra](https://www.geogebra.org/calculator/mxkvmntx) |
| 15 | Lesson 9: Average Rate of Change | In this lesson, you will calculate the average rate of change between two points using a variety of functions. | Model with mathematics. | Use the formula to calculate the average rate of change over the interval [-2, -1] given the function table for . Express your answer as an integer.   |  |  | | --- | --- | |  |  | | -3 |  | | -2 | 1 | | -1 | 3 | | 0 | 9 |   Correct Answer: 2  [Function Analysis Unit Test Item #15 | Desmos](https://www.desmos.com/calculator/shmghhxjfd)  [Function Analysis Unit Test Item #15 - GeoGebra](https://www.geogebra.org/calculator/dgnv7kwa) |
| 16 | Lesson 9: Average Rate of Change | In this lesson, you will describe function graphs in terms of average rates of change. | Model with mathematics. | Describe the behavior of the function by determining over which interval the function has a negative average rate of change.  The average rate of change is negative over the interval [\_\_\_\_, \_\_\_\_].  Correct Answer: [1,2] |
| 17 | Lesson 10: Comparing Average Rates of Change | In this section, you will compare estimated average rates of change of quadratic and exponential functions. | Model with mathematics. | Compare the estimated average rates of change of the exponential function pictured above and the quadratic function over the interval [-9,2].  Correct Answer: The magnitude of the estimated average rate of change of the exponential function over the interval [-9,2] is less than the magnitude of the estimated average rate of change of f(x) over the interval [-9,2].  [Function Analysis Unit Test Item #17 | Desmos](https://www.desmos.com/calculator/nxdthasg1f)  [Function Analysis Unit Test Item #17 - GeoGebra](https://www.geogebra.org/calculator/qps3efjp) |
| 18 | Lesson 10: Comparing Average Rates of Change | In this lesson, you will compare estimated average rates of change of square root and cube root functions. | Model with mathematics. | |  |  |  | | --- | --- | --- | |  | -5 |  | | 0 | -5 | -5 | | 1 | -4 | 0 | | 9 | -2 | 10 |   Compare the estimated average rates of change for the function and over the interval [0.1, 8.9].  Correct Answer: The estimated average rate of change of is greater than the estimated average rate of change of over [0.1, 8.9].  [Function Analysis Unit Test Item #18 | Desmos](https://www.desmos.com/calculator/fr2yqbaapb)  [Function Analysis Unit Test Item #18 - GeoGebra](https://www.geogebra.org/calculator/xxrwkn5r) |
| 19 | Lesson 8: Comparing Shapes of Functions | In this section, you will compare the shapes of linear, quadratic, exponential, and cubic functions. | Model with mathematics. | Graph and compare the shapes and key features of the functions and . In 3–5 sentences, explain how the two functions are similar and how they are different.  Correct Answer:  The student should explain that the function is U-shaped while the function is a straight line. The two graphs have the same domain, which is all real numbers. However, the two graphs have a different range. The range of the linear function is all real numbers. The range of the quadratic function is . Also, the quadratic function has a minimum at (-2, 0), but the linear function does not have a minimum. Also, (-2,0) is the x-intercept for the linear equation. and have the same y-intercept, (0,4).  [Function Analysis Unit Test Item #19 | Desmos](https://www.desmos.com/calculator/adq6926wmk)  [Function Analysis Unit Test Item #19 - GeoGebra](https://www.geogebra.org/calculator/hjrgh4sb) |
| 20 | Lesson 8: Comparing Shapes of Functions | In this lesson, you will compare the shapes of square root and cube root graphs. | Model with mathematics. | Compare the square root and cube root functions by completing the following:  A) Complete an input-output table for the functions and . You do not need to submit the tables.  B) Graph the functions by plotting the points from the input-output table. You do not need to submit the graphs.  C) In 3–5 sentences, discuss the similarities and differences between the graphs of the functions.  Correct Answer:  A) (For reference) The following is a sample input-output table for both functions.    B) (For reference) The following are the plotted points and graphs of both functions.      C) Students should note the similarities and differences. Sample answers include the following: The square root function, , is not defined for negative values of .   * The cube root function, , is greater than on the interval from 0 to 1. * The graphs intersect at the points (0, 0) and (1, 1). * After the intersection at , the square root function, , is greater than . * Both graphs are smooth curves. * Both functions are increasing. * curves up for and curves down for . curves down for .   [Function Analysis Unit Test Item #20 | Desmos](https://www.desmos.com/calculator/d15crnfgwv)  [Function Analysis Unit Test Item #20 - GeoGebra](https://www.geogebra.org/calculator/qbewgrcp) |
| 21 | Lesso 9: Average Rate of Change | In this lesson, you will calculate the average rate of change between two points using a variety of functions. | Model with mathematics. | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Time (hours)** | 0 | 4 | 7 | 9 | 12 | | **Distance (miles)** | 0 | 248 | 449 | 565 | 757 |   The Diaz family went on a road trip for vacation. The table includes a cumulative chart of the time they traveled compared to the distance they drove. Over which interval was their average speed the fastest: [0, 4], [4, 7], [7, 9], or [9, 12]? Explain your reasoning in 1–2 sentences.  Correct Answer:   * Over the first interval [0, 4], the average rate of change is:   miles per hour.   * Over the second interval [4,7], the average rate of change is: miles per hour. * Over the third interval [7, 9], the average rate of change is: miles per hour. * Over the fourth interval [9, 12], the average rate of change is: miles per hour. * The family averaged the fastest speed of 67 miles per hour during the second interval of the trip [4, 7]. |
| 22 | Lesson 9: Average Rate of Change | In this lesson, you will describe function graphs in terms of average rates of change. | Model with mathematics. | Riley is training to run a 5-mile race. The graph represents the distance (miles) she ran with respect to time (minutes) in her first training run. Over which time interval did she run the fastest, [0, 8] or [2, 11]? Justify your answer in 1–2 sentences.  Correct Answer:   * The average rate of change over the interval miles per minute. * The average rate of change over the interval miles per minute. * Riley ran the fastest over the interval [0, 8]. |