# **Algebra 2B Unit Test Guide**

## Exponential & Logarithmic Functions Unit Test

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| **Item** | **Lesson Coverage** | **Objective** | **Mathematical Practice Standard** | **Lesson Page** | **Assessment Item** |
| 1 | Lesson 2: Locating Irrational Numbers | In this section, you will locate irrational numbers on a number line by squeezing them into increasingly smaller intervals. | Model with mathematics. | p. 1-6 | ‘  Examine the number line. The space between each point is approximately unit. If *R = 8* and *S = 8.5*, then determine the **best** whole number square root that *M* represents.  Correct Answer:  [Exponential & Logarithmic Functions Unit Test Item #1 - GeoGebra](https://www.geogebra.org/calculator/vpnc2wbg) |
| 2 | Lesson 2: Locating Irrational Numbers | In this section, you will perform operations on irrational numbers by making increasingly smaller rational approximations. | Model with mathematics. | p. 7-12 | Find an approximation to four decimal places of .  Correct Answer: 0.6748  [Exponential & Logarithmic Functions Unit Test Item #2 - GeoGebra](https://www.geogebra.org/calculator/dtjqkt3h) |
| 3 | Lesson 3: Graphing Logarithmic Functions | In this section, you will graph logarithmic functions with different bases. | Model with mathematics. | p. 1-6 | At what point do the graphs of and intersect?  Correct Answer: (1,0)  [Exponential & Logarithmic Functions Unit Test Item #3 - GeoGebra](https://www.geogebra.org/calculator/wukfeevc) |
| 4 | Lesson 3: Graphing Logarithmic Functions | In this section, you will identify key features of a logarithmic function. | Model with mathematics. | p. 7-12 | Describe the horizontal and vertical asymptotes of .  Correct Answer: The function *f(x)* has a vertical asymptote at x = 0 and no horizontal asymptote.  [Exponential & Logarithmic Functions Unit Test Item #4 - GeoGebra](https://www.geogebra.org/calculator/mjcgnpsu) |
| 5 | Lesson 3: Graphing Logarithmic Functions | In this section, you will compare the key features of logarithmic functions with different bases. | Model with mathematics. | p. 13-18 | The logarithmic equation passes through the point . What is the value of *b*?  Correct Answer: 6  [Exponential & Logarithmic Functions Unit Test Item #5 - GeoGebra](https://www.geogebra.org/calculator/qtssyvuc) |
| 6 | Lesson 4: Corresponding Exponential & Logarithmic Functions | In this section, you will compare the key features of an exponential function to that of its corresponding logarithmic function. | Make sense of problems and persevere in solving them. | p. 1-7 | The point (0.36, 2) lies on the graph . What is the corresponding point on the graph of ?  Correct Answer: (2, 0.36)  [Exponential & Logarithmic Functions Unit Test Item #6 - GeoGebra](https://www.geogebra.org/calculator/w6rat8cr)  [Exponential & Logarithmic Functions Unit Test Item #6 | Desmos](https://www.desmos.com/calculator/1syck7uo8q) |
| 7 | Lesson 4: Corresponding Exponential & Logarithmic Functions | In this section, you will describe the geometric relationship between the graph of an exponential function and its corresponding logarithmic function. | Reason abstractly and quantitatively. | p. 8-13 | If (2, 200) lies on the line , what reflection point lies on the line ?  Correct Answer: (200, 2)  [Exponential & Logarithmic Functions Unit Test Item #7 - GeoGebra](https://www.geogebra.org/calculator/tbnpexdg) |
| 8 | Lesson 5: Inverse Relationships | In this section, you will explore inverse functions graphically and numerically. | Use appropriate tools strategically. | p. 1-7 | Use the table to answer the question.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | -7 | -3 | 3 | 5 | 9 | |  | 5 | 1 | 9 | 3 | -4 |   The table shows the function values of the one-to-one function . Evaluate .  Correct Answer: 6  [Exponential & Logarithmic Functions Unit Test Item #8 - GeoGebra](https://www.geogebra.org/calculator/wytkjp3n) |
| 9 | Lesson 5: Inverse Relationships | In this section, you will find the formula for an inverse function algebraically. | Make sense of problems and persevere in solving them. | p. 8-13 | Identify the inverse of the function .  Function #1:  Function #2:  Function #3:  Correct Answer: Function #2  [Exponential & Logarithmic Functions Unit Test Item #9 - GeoGebra](https://www.geogebra.org/calculator/axgzwnua) |
| 10 | Lesson 5: Inverse Relationships | In this section, you will establish that the functions *f (x)* = *logbx*  and *g (x)* = *bx* are inverses of each other. | Look for and make use of structure. | p. 14-19 | Which function is the inverse of ?  Correct Answer:  [Exponential & Logarithmic Functions Unit Test Item #10 - GeoGebra](https://www.geogebra.org/calculator/gvkwhtbt) |
| 11 | Lesson 6: General Form of an Exponential Function | In this section, you will identify the transformations in the functions of the form *f (x)* = *ab(x−h) + k*. | Make sense of problems and persevere in solving them. | p. 1-7 | If is horizontally stretched by a factor of 5, moved up 3 units, and reflected across the x-axis, which of the following is the new expression of ?  Option #1:  Option #2:  Option #3:  Option #4:  Correct Answer: Option #2  [Exponential & Logarithmic Functions Unit Test Item #11 - GeoGebra](https://www.geogebra.org/calculator/r6m6swk7) |
| 12 | Lesson 6: General Form of an Exponential Function | In this section, you will use transformations to graph exponential functions of the form *f (x) = a(b)x−h + k*. | Model with mathematics. | p. 8-13 | Which of the following exponential equations shows a horizontal stretch of the function ?  Correct Answer:  [Exponential & Logarithmic Functions Unit Test Item #12 - GeoGebra](https://www.geogebra.org/calculator/qezybkge) |
| 13 | Lesson 6: General Form of an Exponential Function | In this section, you will use the properties of exponents to rewrite functions of the form *f (x) = a(b)x−h + k* that can be graphed using transformations. | Make sense of problems and persevere in solving them. | p. 14-19 | Which of the following uses the properties of exponents to correctly rewrite to determine the vertical stretch or shrink of the function from its parent function?  Correct Answer: vertical shrink by a factor of |
| 14 | Lesson 7: General Form of a Logarithmic Function | In this section, you will identify transformations of logarithmic functions in the form of *f (x) = alogb (x−h) + k*. | Make sense of problems and persevere in solving them. | p. 1-7 | Given the function , which of the following functions is the transformation of right 6 units, up 3 units, stretched vertically by a factor of 2, and reflected across the x-axis?  Option #1:  Option #2:  Option #3:  Option#4:  Correct Answer: Option #3  [Exponential & Logarithmic Functions Unit Test Item #14 - GeoGebra](https://www.geogebra.org/calculator/egxbdyuf) |
| 15 | Lesson 7: General Form of a Logarithmic Function | In this section, you will use transformations to graph functions of the form *f (x) = alogb (x−h) + k*. | Model with mathematics. | p. 8-13 | Describe the transformation that occurred to the parent logarithmic function.  Correct Answer: a shift down 3 units  [Exponential & Logarithmic Functions Unit Test Item #15 - GeoGebra](https://www.geogebra.org/calculator/tjdrbswx) |
| 16 | Lesson 7: General Form of a Logarithmic Function | In this section, you will use the properties of logarithms to rewrite functions of the *f (x) = alogb (x−h) + k* that can be graphed using transformations. | Make sense of problems and persevere in solving them. | p. 14-19 | Which of the following uses the properties of logarithms to correctly rewrite ?  Correct Answer:  [Exponential & Logarithmic Functions Unit Test Item #16 - GeoGebra](https://www.geogebra.org/calculator/ngtyngyu) |
| 17 | Lesson 8: Solving Exponential Equations | In this section, you will solve exponential equations using the properties of logarithms and the inverse relationship between exponential and logarithmic functions. | Make sense of problems and persevere in solving them. | p. 1-6 | Consider the following scenario: A sample of radioactive material has a decay constant of 0.04 per hour. If there are initially 500 grams of the material, how much will remain after 3 hours?  Correct Answer:  [Exponential & Logarithmic Functions Unit Test Item #17 - GeoGebra](https://www.geogebra.org/calculator/uzhvp2sm) |
| 18 | Lesson 8: Solving Exponential Equations | In this section, you will solve exponential equations by locating the point of intersection on a graph of two exponential functions or an exponential and a linear function. | Make sense of problems and persevere in solving them. | p. 7-12 | The intersection of *f(x)* and *g(x)* is the point (0.3, 9.5). What is the solution of the equation *f(x)=g(x)*?  Correct Answer: x = 0.3 |
| 19 | Lesson 2: Locating Irrational Numbers | In this section, you will perform operations on irrational numbers by making increasingly smaller rational approximations. | Model with mathematics. | p. 7-12 | In 3-5 sentences, explain how to approximate to four decimal places.  Correct Answer:   * The first step is to find that and that * The next step is to squeeze each irrational number into an approximation with five decimal places, such that and . * Next, students should multiply the lower and upper bounds: , or . * The final step is to round each approximation to four decimal places, such that , or . * Thus, can be approximated as 0.1436.   [Exponential & Logarithmic Functions Unit Test Item #19 - GeoGebra](https://www.geogebra.org/calculator/wz8bpbyc) |
| 20 | Lesson 4: Corresponding Exponential & Logarithmic Functions | In this section, you will describe the geometric relationship between the graph of an exponential function and its corresponding logarithmic function. | Reason abstractly and quantitatively. | p. 8-13 | In 1-2 sentences, describe the geometric relationship between and as it would be represented on a graph.  Correct Answer:  Students should describe the graphs of and as reflections of each other across the line . The domain of is the range of , and their intercepts switch along with all other points on either line.  [Exponential & Logarithmic Functions Unit Test Item #20 - GeoGebra](https://www.geogebra.org/calculator/bbeta9dj) |
| 21 | Lesson 5: Inverse Relationships | In this section, you will establish that the functions *f (x)* = *logbx*  and *g (x)* = *bx* are inverses of each other. | Look for and make use of structure. | p. 14-19 | In 3–5 sentences, describe the process for establishing the inverse of a logarithmic function and what will be the resulting function.  Correct Answer:  Student answers should describe the following steps to find the inverse of a logarithmic function:   * First, rewrite the function into an equation by replacing with *y*. * Next, swap the *x* and *y* in the equation. Solve for *y* by rewriting the logarithmic equation. * Lastly, replace *y* with the inverse notation . * The result will be an exponential function. |
| 22 | Lesson 6: General Form of an Exponential Function | In this section, you will identify the transformations in the functions of the form *f (x)* = *ab(x−h) + k*. | Make sense of problems and persevere in solving them. | p. 1-7 | Identify all transformations of from its parent function. In 3-5 sentences, describe transformations.  Correct Answer:  Student answers should include .   * The constant is multiplied to the function, which indicates that the function is vertically shrunk by a factor of . * The negative sign of the exponent means the function is reflected across the y-axis. Subtracting 5 from x means it is shifted right 5 units. * The constant 8 is added to the function, which means it is vertically shifted up 8 units. |
| 23 | Lesson 7: General Form of a Logarithmic Function | In this section, you will identify transformations of logarithmic functions in the form of *f (x) = alogb (x−h) + k*. | Make sense of problems and persevere in solving them. | p. 1-7 | Given the function , construct the function such that the graph of is the same as the graph of but shifted 7 units down, shrunk vertically by a factor of , and reflected across the y-axis. In 1–2 sentences, describe the construction of the function and identify the correct function.  Correct Answer:  Student answers should include the following:   * First, the function is shifted down if *k* is negative. To shift 7 units down, * Second, the function is vertically shrunk if . To shrink the graph vertically by a factor of , . * Last, the function is reflected across the y-axis. * The correct function of the graph would be . |