# **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.

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| --- | --- | --- | --- | --- | --- |
| 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.
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| 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.
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| 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 .
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