# **Algebra 2B Unit Test Guide**

## Logarithms Unit Test

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| **Item** | **Lesson Coverage** | **Objective** | **Mathematical Practice Standard** | **Lesson Page** | **Assessment Item** |
| 1 | Lesson 2: The Need for Logarithms | In this section, you will solve exponential equations with variable exponents using tables of over and under estimates. | Model with mathematics. | Pages 1-6 | The exponential equation does not have an integer solution. Use an over/under table to find an estimate of the solution to two decimal places.  The solution to the exponential equation is \_\_\_\_.  Correct Answer: 2.26  [Logarithms Unit Test item #1 | Desmos](https://www.desmos.com/calculator/yxqljyzjaw) |
| 2 | Lesson 2: The Need for Logarithms | In this section, you will rewrite exponential expressions as logarithms and logarithms as exponential expressions. | Look for and make use of structure. | Pages 7-13 | Rewrite as a logarithmic equation.  Correct Answer:  [Logarithms Unit Test Item #2 - GeoGebra](https://www.geogebra.org/calculator/jz3rrfpd) |
| 3 | Lesson 2: The Need for Logarithms | In this section, you will explore which numbers can be used as a logarithmic base and which numbers for which you can find the logarithms. | Model with mathematics. | Pages 13-17 | Which of the following logarithmic expressions is undefined?  Correct Answer:  [Logarithms Unit Test Item #3 - GeoGebra](https://www.geogebra.org/calculator/wtdmbtgj) |
| 4 | Lesson 3: The Exponent-Logarithm Relationship | In this section, you will use the properties of exponents to prove and and generalize to find that . | Make sense of problems and persevere in solving them. | Pages 1-6 | Which of the following is the value of ?  Correct Answer: 20  [Logarithms Unit Test Item #4 - GeoGebra](https://www.geogebra.org/calculator/q45ydtth) |
| 5 | Lesson 3: The Exponent-Logarithm Relationship | In this section, you will use the relationship between exponents and logarithms to prove . | Construct viable arguments and critique the reasoning of others. | Pages 7-12 | Solve for x in the logarithmic equation .  Correct Answer: 24  [Logarithms Unit Test Item #5 - GeoGebra](https://www.geogebra.org/calculator/vquwsynv) |
| 6 | Lesson 3: The Exponent-Logarithm Relationship | In this section, you will use the properties , , , and to evaluate logarithms. | Make sense of problems and persevere in solving them. | Pages 13-17 | If , what is the value of x?  Correct Answer:  [Logarithms Unit Test Item #6 - GeoGebra](https://www.geogebra.org/calculator/axrb82ty) |
| 7 | Lesson 4: The Product Rule of Logarithms | In this section, you will use numerical analysis and logarithm rules to establish that , leading to . | Construct viable arguments and critique the reasoning of others. | Pages 1-7 | Evaluate .  Correct Answer:  [Logarithms Unit Test Item #7 - GeoGebra](https://www.geogebra.org/calculator/dwq2c4gv) |
| 8 | Lesson 4: The Product Rule of Logarithms | In this section, you will use numerical reasoning and the rules of exponents to show that . | Look for and express regularity in repeated reasoning. | Pages 8-12 | Use the rule to find  Correct Answer: 10  [Logarithms Unit Test Item #8 - GeoGebra](https://www.geogebra.org/calculator/hrvc4jkw) |
| 9 | Lesson 4: The Product Rule of Logarithms | In this section, you will use the property to evaluate logarithms. | Make sense of problems and persevere in solving them. | Pages 13-17 | Which of the following is the value of if and ?  Correct Answer:  [Logarithms Unit Test Item #9 - GeoGebra](https://www.geogebra.org/calculator/xkwbepys) |
| 10 | Lesson 5: The Power Rule of Logarithms | In this section, you will show that means that . | Construct viable arguments and critique the reasoning of others. | Pages 1-5 | Which of the following is equivalent to ?  Option #1:  Option #2:  Option #3:  Correct Answer: Option #1  [Logarithms Unit Test Item #10 - GeoGebra](https://www.geogebra.org/calculator/rn9z8err) |
| 11 | Lesson 5: The Power Rule of Logarithms | In this section, you will use the property to evaluate logarithms. | Make sense of problems and persevere in solving them. | Pages 6-10 | Which of the following is equal to ?  Correct Answer:  [Logarithms Unit Test Item #11 - GeoGebra](https://www.geogebra.org/calculator/qpw6wzvd) |
| 12 | Lesson 6: The Quotient Rule of Logarithms | In this section, you will use numerical analysis and the property to establish that . | Construct viable arguments and critique the reasoning of others. | Pages 1-6 | Using numerical analysis and the Power Rule of Logarithms, how can be rewritten?  Correct Answer:  [Logarithms Unit Test Item #12 - GeoGebra](https://www.geogebra.org/calculator/um2hazxx) |
| 13 | Lesson 6: The Quotient Rule of Logarithms | In this section, you will use numerical analysis and the properties of and to establish that . | Look for and express regularity in repeated reasoning. | Pages 7-12 | Using numerical analysis and the Quotient Rule of Logarithms, how can be rewritten?  Correct Answer:  [Logarithms Unit Test Item #13 - GeoGebra](https://www.geogebra.org/calculator/q8bkdtpc) |
| 14 | Lesson 6: The Quotient Rule of Logarithms | In this section, you will use the properties and to evaluate logarithms. | Make sense of problems and persevere while solving them. | Pages 13-18 | Which of the following options correctly rewrites using the Quotient Rule of Logarithms, the Product Rule of Logarithms, and the Power Rule of Logarithms?  Option #1:  Option #2:  Option #3:  Correct Answer: Option #2  [Logarithms Unit Test item #14 - GeoGebra](https://www.geogebra.org/calculator/vft4qnej) |
| 15 | Lesson 7: Changing Logarithm Bases | In this section, you will change the bases of logarithms. | Make sense of problems and persevere in solving them. | Pages 1-6 | Using the change of base formula, the following expression was created: . Identify the base of the original expression.  Correct Answer: 32  [Logarithms Unit Test Item #16 - GeoGebra](https://www.geogebra.org/calculator/ez2vknrm) |
| 16 | Lesson 7: Changing Logarithm Bases | In this section, you will evaluate logarithms by changing their bases. | Make sense of problems and persevere in solving them. | Pages 7-12 | What value is equivalent to to the nearest thousandth? Use the change of base formula to determine your answer.  Correct Answer: 3.700  [Logarithms Unit Test Item #16 - GeoGebra](https://www.geogebra.org/calculator/wrexaguh) |
| 17 | Lesson 8: Properties of Logarithms with any Base | In this section, you will show that the properties of logarithms hold for logarithms of any base, b. | Construct viable arguments and critique the reasoning of others. | Pages 1-8 | Calian wants to construct a viable argument to justify that for and . Fill in the blanks to help him construct his argument.  Correct Answer:  Any positive number raised to the power is equal to itself. Written as an equation, this means that for any positive base. This equation is equivalent to the logarithmic equation . Therefore, it must be true that for any positive base that is not equal to 1.  Blank #1:  Blank #2:  Blank #3:  Blank #4: |
| 18 | Lesson 8: Properties of Logarithms with any Base | In this section, you will use the properties of logarithms of base b to evaluate logarithms. | Make sense of problems and persevere in solving them. | Pages 9-16 | Expand the logarithm .  Correct Answer: |
| 19 | Lesson 9: Solving Logarithmic Equations | In this section, you will solve equations of the form of by rewriting them in the form . | Look for and make use of structure. | Pages 1-7 | Solve the equation .  Correct Answer:  [Logarithms Unit Test Item #19 - GeoGebra](https://www.geogebra.org/calculator/xd4jxxfh) |
| 20 | Lesson 9: Solving Logarithmic Equations | In this section, you will solve equations of the form by equating Y to Z. | Look for and make use of structure. | Pages 8-13 | Solve the logarithmic equation .  Correct Answer: 15  [Logarithms Unit Test Item #20 - GeoGebra](https://www.geogebra.org/calculator/qnywbdkf) |
| 21 | Lesson 2: The Need for Logarithms | In this section, you will solve exponential equations with variable exponents using tables of over and under estimates. | Model with mathematics. | Pages 1-6 | Ramona was asked to estimate the solution to the exponential equation by using an over/under table and providing her answer to two decimal places. She gave an estimated solution of . In 3–5 sentences, explain why this is an unreasonable estimate of the solution to this equation.  Correct Answer:  The first step will be to isolate the exponential term to get . By evaluating powers of 4, it can be seen that the solution to has a value somewhere between and . Therefore, it is reasonable to assume that has a solution that is also in that range. Ramona’s estimate of is outside of that range, and a calculator will show that , which is much lower than the target value of 42. |
| 22 | Lesson 7: Changing Logarithm Bases | In this section, you will change the bases of logarithms. | Make sense of problems and persevere in solving them. | Pages 1-6 | Recall what you know about the change of base formula. Using the formula, write a new logarithm in 1–2 sentences so that can be easily evaluated.  Correct Answer:  Student answers should indicate that the logarithm can be rewritten as . The change of base formula is ; both numbers 256 and 8 are powers of 2. |
| 23 | Lesson 8: Properties of Logarithms with any Base | In this section, you will show that the properties of logarithms hold for logarithms of any base, b. | Construct viable arguments and critique the reasoning of others. | Pages 1-8 | Show that the Quotient Rule of Logarithms works for the base 4 expression  Correct Answer:  By the Quotient Rule of Logarithms, should be equivalent to , which is .  First, find .  because .  because .  Therefore,  Next, find .  Both and are equal to 1, so . This shows that the Quotient Rule of Logarithms works for this base 4 expression. |