

Algebra 2 Unit 4

Big Idea 3: Logarithms and exponents can be used to solve mathematical and real-world problems.

	Lesson 1	Lesson 2	Lesson 3	Lesson 4
Goal	<p>Discover and describe the relationship between an exponential function and a logarithmic function.</p> <p>Link to Teacher Notes</p>	<p>Recognize the necessity of converting an exponential function to logarithmic and vice versa when given a mathematical or real world situation. Justify that logarithmic functions and exponential functions are inverses of each other algebraically and graphically.</p> <p>Link to Teacher Notes</p>	<p>Justify converting between exponential and logarithmic functions when solving for an unknown quantity. Recognize restrictions or unnecessary domain and range values in mathematical and real world scenarios.</p> <p>Link to Teacher Notes</p>	<p>Use the properties of logarithms to solve exponential and logarithmic functions for an unknown quantity. Discover and describe the natural logarithm and base e.</p> <p>Link to Teacher Notes</p>
Launch	<p>Use graph on Desmos, or found in teacher notes to project to the class. Have students notice/wonder about the graphs.</p>	<p>Display the table found in teacher notes and have students complete the table.</p>	<p>Have students list as many exponent properties as they can in 5 minutes. (table included in teacher notes for help)</p>	<p>Use Activity 1 from projectmaths (found on page 15, answers on page 16). Students may need help determining the value of i for the first few rows. Ask them to conjecture about what they notice about the answers they are getting.</p>
Student Work Time	<p>Using graphing technology, have students graph $y = 10^x$ and $y = \log_{10}(x)$ and fill in the missing point found on teacher notes.</p>	<p>Distribute SWT notes and have students work to fill in the blanks. Students may work in pairs or individually.</p>	<p>Pass out the card sort and instruct students that 6 of the cards are exponent properties and 5 of them are logarithmic properties. Have them match the 3 exponent properties they think are directly related to the logarithmic properties. Three of the exponent properties and two of the</p>	<p>Introduce students to the number e. Explain that this is used in exponential functions just like the one in the launch task. Write $y = e^x$ on the board and have students convert it to a logarithmic equation. Introduce \ln in place of log for base e.</p>

			logarithmic properties will not have matches.	
Discussion & Synthesis	<p>After students have found the missing points ask them to conjecture about the relationship between the two graphs. Let this lead to remembering the definition of “inverse” and a discussion about how the inverse of an exponential function is a logarithmic function.</p> <p>Walk students through questions found on teacher notes.</p>	<p>Once students have a basic understanding of relationship between exponential and logarithmic, have them work through mathequalslove foldable for more practice.</p> <p>Ensure that students are working problems correctly by having discussions about answers they are getting.</p>	<p>While discussing the properties of logarithms, have students complete the foldable from mathequalslove (properties of logarithms) and give examples of each.</p>	<p>Work through examples and problems found here. (Lesson A only- skip factoring if too challenging for students)</p>
Application	<p>EngageNY student version (PDF)</p> <p>EngageNY teacher version (PDF)</p> <p>Customize to fit your class needs.</p> <p>Website with both PDF and Doc versions found here.</p>	<p>Use handouts found here to play war or here to do speed-dating, or both if time allows.</p>	<p>Engage NY student version (start on page 4/ customize for class)</p> <p>Engage NY teacher version</p> <p>Website with both PDF and Doc versions</p>	<p>Use practice problems 1-4 on here for practice.</p>
Reflection	<p>What similarities do exponential and logarithmic graphs have?</p> <p>What differences do you notice?</p>	<p>How would you explain the relationship between logarithmic and exponential functions to someone who was absent today?</p>	<p>Use exit ticket from EngageNY teacher version for challenge.</p> <p>What are two things I will remember about properties of logarithms?</p>	<p>One thing I noticed about \ln and e is.....</p> <p>One thing I still wonder about \ln and e is</p>

			What is one thing I will struggle to remember about properties of logarithms?	
Additional Tasks	Polygraph on Desmos			