Lesson 11: The Most Important Property of Logarithms

Classwork

Opening Exercise

Use the logarithm table below to calculate the specified logarithms.

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* 2. for an integer

Exercises 1–5

1. Use your calculator to complete the following table. Round the logarithms to four decimal places.

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1. Calculate the following values. Do they appear anywhere else in the table?
2. What pattern(s) can you see in Exercise 2 and the table from Exercise 1? Write them using logarithmic notation.
3. What pattern would you expect to find for ? Make a conjecture, and test it to see whether or not it appears to be valid.
4. Make a conjecture for a logarithm of the form , where , and are positive real numbers. Provide evidence that your conjecture is valid.

**Example 1**

Use the logarithm table from Exercise 1 to approximate the following logarithms:

Exercises 6–8

1. Use your calculator to complete the following table. Round the logarithms to four decimal places.

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1. What pattern(s) can you see in the table from Exercise 6? Write a conjecture using logarithmic notation.
2. Use the definition of logarithm to justify the conjecture you found in Exercise 7.

**Example 2**

Use the logarithm tables and the rules we discovered to estimate the following logarithms to four decimal places.

Lesson Summary

* The notation is used to represent .
* The most important property of logarithms base is that for positive real numbers and ,
* For positive real numbers ,

Problem Set

1. Use the table of logarithms at right to estimate the value of the logarithms in parts (a)–(h).

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1. Use the table of logarithms at right to estimate the value of the logarithms in parts (a)–(f).
2. Use the table of logarithms at right to estimate the value of the logarithms in parts (a)–(f).
3. Reduce each expression to a single logarithm of the form .
4. Use properties of logarithms to write the following expressions involving logarithms of only prime numbers.
5. Use properties of logarithms to show that
6. Use properties of logarithms to show that
7. Use properties of logarithms to show that
8. Use properties of logarithms to show that