The Ninth Grade Math Competition Class

Logarithm Challenging Problems

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0. What is the logarithm of $27\sqrt[4]{9}\sqrt[3]{9}$ base 3?

1. Find x if $\log_9(2x - 7) = \frac{3}{2}$.

2. Find $\log_{\sqrt{3}} \sqrt[3]{9}$.

3. Solve the equation $\log_{2x} 216 = x$, where x is real.

4. Find base b such that $\log_b 5\sqrt{5} = \frac{5}{2}$.

5. If $\log_2 b - \log_2 a = 3$, then $b^2 - a^2 = Ma^2$, compute M.

6. If $\frac{\log_b a}{\log_c a} = \frac{19}{99}$, $\frac{b}{c} = c^k$, find the value of k.

7. Let $T = 1.8$, compute base b if $\log_b(75T) = 2 + \log_b 3 + \log_b 5$.

8. If $\log_{225} x + \log_x 15 = \frac{11}{6}$, find x.

9. Evaluate $\dfrac{1}{\log_2 \frac{1}{6}} - \dfrac{1}{\log_3 \frac{1}{6}} - \dfrac{1}{\log_4 \frac{1}{6}}$

10. Compute the value of n for which $\dfrac{1}{\log_2 100} + \dfrac{1}{\log_3 100} + \dfrac{1}{\log_6 100} + \dfrac{1}{\log_9 100} = \dfrac{2}{\log_N 100}$.

11. Given the points $A\,(\log 2, \log 3)$ and $B\,(\log(\log T^2), \log(\log T^3))$, compute the slope of the line $\overleftrightarrow{AB}$.

12. Given that $\log_6 a + \log_6 b + \log_6 c = 6$, and a, b, c are positive integers that form an increasing geometric sequence and $b - a$ is the square of an integer. Find $a + b + c$.