

1989 National Mu Alpha Theta Convention
LOGS AND EXPONENTS TOPIC TEST

1. If $8^x = 32$, then $x =$.
 a. 4 b. $5/3$ c. $3/2$ d. $3/5$ e. NOT
2. Find t if $\ln e^{\tan t} = \sin t$, for $0 < t < \pi$.
 a. $\{\pi/3\}$ b. $\{0\}$ c. $\{0, \pi\}$ d. $\{\pi/4\}$ e. NOT
3. Simplify: $\log 8$ divided by $\log (1/8)$.
 a. 0 b. 1 c. $\log 2$ d. $6\log 2$ e. NOT
4. If $R = \frac{a}{(1+b)^n}$, then $n =$.
 a. $\frac{\log a - \log R}{\log(1+b)}$ b. $\frac{\log(a-R)}{\log(1+b)}$ c. $\log \frac{a}{R(1+b)}$
 d. $\frac{a}{R(1+b)}$ e. NOT
5. Let $n = x - y^{x-y}$. Find n when $x = 2$ and $y = -2$.
 a. -14 b. 0 c. 1 d. 18 e. NOT
6. Consider the graphs $y = 2$ and $y = \log 2x$. It could be said that:
 a. the graphs do not intersect.
 b. the graphs intersect in exactly one point.
 c. the graphs intersect in exactly two points.
 d. the graphs intersect in a finite number of points, but more than two.
 e. NOT
7. Solve for x : $4^{3x+1} = 16^{2x-3}$.
 a. 2 b. 4 c. $13/2$ d. 7 e. NOT
8. Simplify: $\frac{5^{x-2}(5^x - 5^{x-1})}{25^{x-1}}$
 a. $1/5$ b. $4/5$ c. 1 d. 5 e. NOT
9. Let r be the result of doubling both the base and the exponent of a^b , $b \neq 0$. If r equals the product of a^b and x^b , then x :
 a. a b. $2a$ c. $4a$ d. 2 e. NOT

10. Solve for x : $\log x^2 + \log 2 - \log 7 = 1$
 a. $5/7$ b. $\sqrt{35}$ c. $\pm\sqrt{35}$ d. 35 e. NOT
11. If $2^3 = 8$ may be written as $\log_2 8 = 3$, then which of the following numbers may be used for x in $\log_3 x = 2$?
 a. 8 b. 6 c. 5 d. 9 e. NOT
12. Solve for x : $\log x \geq \log 2 + (1/2)\log x$.
 a. $x \geq 2$ b. $x \geq 4$ c. $x < 2$ or $x \geq 4$ d. $2 \leq x \leq 4$ e. NOT
13. Solve for x : $(\log_5 x)(\log_3 25) = 2$
 a. $\sqrt[5]{9}$ b. 9 c. ± 2 d. ± 3 e. NOT
14. Find the last two digits of $11^9 - 1$.
 a. 09 b. 80 c. 00 d. 10 e. NOT
15. Determine the characteristic of $\log_2 600$.
 a. 7 b. 8 c. 9 d. 10 e. NOT
16. Find the sum of the solutions to the equation $7^{6x^2} - x - 2 = 1$.
 a. $7/6$ b. $1/6$ c. $1/2$ d. $2/3$ e. NOT
17. Evaluate: $64^{2/3} + 64^{1/6} + 64^{1/2}$.
 a. 26 b. 50 c. $256/3$ d. 256 e. NOT
18. Solve for x : $\log(x^2 - 4) - \log(x + 2) = \log 4$
 a. $\{6\}$ b. $\{6, 2\}$ c. $\{10002\}$ d. $\{\}$ e. NOT
19. If $2^x = 4^{y+1}$, and $x^2 = -(y+1)^4$; find the sum of the possible values of x .
 a. 0 b. 2 c. 4 d. infinite e. NOT
20. Evaluate: $\frac{\ln|\cos 120^\circ|^4}{\ln(\sin 30^\circ)}$
 a. 256 b. 0 c. $-7/16$ d. 4 e. NOT
21. Solve for x : $\frac{4^{x+4} + 8^{x-2}}{2^{2x+6}} = 2052$
 a. -1 b. 11 c. 17 d. 23 e. NOT

22. Which of the numbers listed below is the largest?

- a. 2^{-100} b. 3^{-60} c. 5^{-50} d. 7^{-40} e. NOT

23. If $\log 8 = b$ and $\log 7 = a$, find $\log_{49} 100 + \log_8 7$.

- a. $\frac{(a+b)}{ab}$ b. $\frac{(a^2 + b)}{ab}$ c. $\frac{(2b + 7a^2)}{7ab}$
d. $(-a-b+2)$ e. NOT

24. Simplify: $\left[\frac{a^2 - a^{-2}}{(a^{1/2} + a^{-1/2})(a^{1/2} - a^{-1/2})} \right]^{-1}$

- a. $\frac{a}{a^2 + 1}$ b. $a-1$ c. $a^2 + 1$ d. a e. NOT

25. Simplify: $(-\frac{1}{8}a^{-6}b^{12})^{-1/3}$

- a. $\frac{1}{2}a^2b^4$ b. $\frac{2a^2}{b^4}$ c. $\frac{-2a^2}{b^4}$ d. $\frac{-b^4}{2a^2}$ e. NOT

26. If $\log_3 2 = .631$ and $\log_3 5 = 1.465$, find $\log_3 (5/9)$.

- a. $-.635$ b. $-.563$ c. $-.535$ d. $-.615$ e. NOT

27. Simplify: $\frac{(\log 81)(\log 1024)(\log 7776)}{(\log 1296)(\log 3)(\log 32)}$

- a. 1 b. 10 c. 100 d. 1000 e. NOT

28. Simplify: $2^{-n} \cdot 8^{n-1} \cdot 4^{n+3} \div 16^n$

- a. 8 b. 2^{3n} c. 4 d. 4^n e. NOT

29. If x and $\log x$ are real numbers and $\log x < 0$, then:

- a. $x < 0$ b. $-1 < x < 1$ c. $0 < x < 1$ d. $-1 < x < 0$ e. NOT

30. Evaluate: $E^{\log_E 3}$

- a. $1/E$ b. 3 c. $\log 3$ d. E e. NOT