NAME Key DATE HOUR

ALGEBRA 2 TEST REVIEW: Logarithm Unit

Recall: $a^n \cdot a^m =$ a^{n+m} and $(a^n)^m =$ a^{nm}

Simplify.

1. $6^{\sqrt{2}} \cdot 6^{\sqrt{3}} =$ $6^{\sqrt{2}+\sqrt{3}}$
2. $8^{\sqrt{5}} \cdot 8^{3\sqrt{5}} =$ $8^{4\sqrt{5}}$
3. $(x^{\sqrt{7}})^{\sqrt{7}} =$ x^7
4. $(x^{\sqrt{5}})^{\sqrt{20}} =$ $x^{\sqrt{100}} \rightarrow x^{10}$
5. $\frac{3^{\sqrt{6}}}{3^{\sqrt{5}}} =$ $3^{\sqrt{6}-\sqrt{5}}$
6. $\frac{49^{\sqrt{2}}}{7^{\sqrt{2}}}$ $\frac{7^{2\sqrt{2}}}{7^{\sqrt{2}}} = 7^{\sqrt{2}}$

Solve.

7. $9 = 3^{5n+7}$
$3^2 = 3^{5n+7}$
$2 = 5n + 7$
$n = -1$
8. $9^x = \frac{1}{81}$
$9^x = 9^{-2}$
$x = -2$
9. $2^{6x} = 4^{5x+2}$
$2^{6x} = 2^{2(5x+2)}$
$6x = 10x + 4$
$x = -1$
10. $49^{3p+1} = 7^{2p-5}$
$7^{2(3p+1)} = 7^{2p-5}$
$6p + 2 = 2p - 5$
$4p = -7$ $p = \frac{-7}{4}$
11. $1 = 7^{7x}$
$7^0 = 7^{7x}$
$x = 0$
12. $\frac{1}{8} = 2^{3x-1}$
$2^{-3} = 2^{3x-1}$
$-3 = 3x - 1$
$-2 = 3x$
$x = \frac{-2}{3}$

Write each equation in logarithmic form.

13. $2^4 = 16$
$\log_2 16 = 4$
14. $5^{-2} = \frac{1}{25}$
$\log_5 \frac{1}{25} = -2$
15. $4^0 = 1$
$\log_4 1 = 0$

Write each equation in exponential form.

16. $\log_6 36 = 2$
$6^2 = 36$
17. $\log_{289} 17 = \frac{1}{2}$
$289^{\frac{1}{2}} = 17$
18. $\log_8 2 = \frac{1}{3}$
$8^{\frac{1}{3}} = 2$

Evaluate each expression.

(Set each log expression equal to x, re-write in exponent form, then solve for x.)

19. $\log_3 27 = x$
$3^x = 27$
$x = 3$
20. $\log_8 8^6 = x$
$8^x = 8^6$
$x = 6$
21. $\log_{64} 8 = x$
$64^x = 8$
$x = \frac{1}{2}$

Solve each equation .

22. $\log_3 81 = y$

$3^y = 81$

$y = 4$

No Soln

23. $\log_2(4x + 10) = \log_2(x + 1)$

$4x + 10 = x + 1$

$3x = -9$

$x = -3$ ↑ doesn't work!

24. $\log_7(x^2+x)=\log_7 12$

$x^2 + x = 12$

$x^2 + x - 12 = 0$

$(x + 4)(x - 3) = 0$

$x = -4 \quad x = 3$

Evaluate each expression & round answer to 3 decimal places.

25. $\log_2 21$

26. $\log_4 3$

Solve each equation.

27. $\log_2 4 + \log_2 6 = \log_2 x$

$\log_2 24 = \log_2 x$

$x = 24$

28. $3 \log_7 x - \log_7 5 = \log_7 25$

$\frac{x^3}{5} = 25$

$x^3 = 125$

$x = 5$

29. $2\log_2 x - \log_2(x+3) = 2$

$\log_2 \frac{x^2}{x+3} = 2$

$2^2 = \frac{x^2}{x+3}$

$4x + 12 = x^2$

$x^2 - 4x - 12 = 0$

$(x - 6)(x + 2)$

$x = 6, -2$

30. $\log_7 m = \frac{1}{3}\log_7 64 + \frac{1}{2}\log_7 121$

$m = 64^{\frac{1}{3}} * 121^{\frac{1}{2}}$

$m = 4 * 11 = 44$

Solve each exponential equation. Round ans. to 3 decimal places.

31. $9^x = 45$

$x = \frac{\log 45}{\log 9}$

$x = 1.732$

32. $2^x = 30$

$x = \frac{\log 30}{\log 2}$

$x = 4.907$

33. $\log_5 16 = x$

1.723

34. $\log_6 82 = x$

2.459

35. $7^{3x} = 56$

$3x = \frac{\log 56}{\log 7}$

$x = .690$

36. $9^{2x-3} = 4$

$2x - 3 = \frac{\log 4}{\log 9}$

$2x - 3 = .631$

$x = 1.815$

37. $7.6^{x-1}=431$

$x - 1 = \frac{\log 431}{\log 7.6}$

$x = 3.991$

38. $3^x=5^{x-1}$

$x \log 3 = (x-1)\log 5$

$\frac{x \log 3}{\log 3} = \frac{(x-1)\log 5}{\log 3}$

$x = 1.465x - 1.465$

$x = 3.151$

39. $2^x=6^{x+3}$

$x \log 2 = (x+3)\log 6$

$2.585x + 7.755$

$x = -4.905$