

Key Logarithms + Exponentials Test Review

Write each equation in logarithmic form.

1. $2^3 = 8$

$\log_2 8 = 3$

2. $3^2 = 9$

$\log_3 9 = 2$

Write each equation in exponential form.

3. $\log_3 243 = 5$

$3^5 = 243$

4. $\log_4 64 = 3$

$4^3 = 64$

Evaluate each expression.

5. $\log_5 25$

$\frac{\log 25}{\log 5} = 2$

6. $\log_8 8^3$

$\frac{\log 512}{\log 8} = 3$

7. $\log_{27} \frac{1}{3}$

$\frac{\log \frac{1}{3}}{\log 27} = -\frac{1}{3}$

Solve each equation or inequality. Check your solutions.

8. $\log_2 (4x - 4) > 5$

$2^5 > 4x - 4$
 $32 > 4x - 4$
 $36 > 4x$

$9 > x$
 $x < 9$

9. $\log_3 (x + 2) = \log_3 (3x)$

$x + 2 = 3x$
 $2 = 2x$

$x = 1$

10. $\log_b 3 = \frac{1}{2}$

$(b^{1/2})^2 = 3^2$

$b = 9$

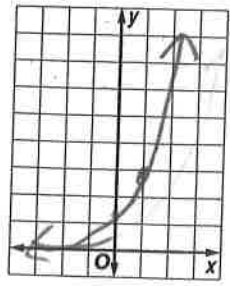
11. $\log_4 x = 3$

$\frac{1}{4}^3 = x$

$x = \frac{1}{64}$

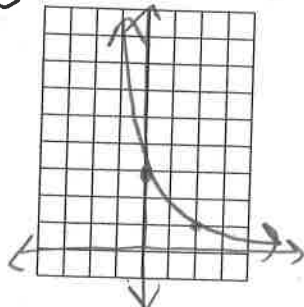
Sketch the graph of each function. Then state the function's domain and range.

12. $y = 1.5(2)^x$



domain: \mathbb{R}
 Range: $y > 0$

13. $y = 3(0.5)^x$



D: \mathbb{R}
 Range: $y > 0$

Determine whether each function represents exponential growth or decay.

14. $y = 5(0.6)^x$

decay

15. $y = 0.1(2)^x$

growth

16. $y = 5 \cdot 4^{-x}$

decay

$5(1/4)^x$

Write an exponential function whose graph passes through the given points.

17. (0, 1) and (-1, 4)

$$y = ab^x$$

$$y = 1b^x$$

$$1 = ab^0$$

$$4 = 1b^{-1}$$

$$a = 1$$

$$4 = b^{-1}$$

$$b = 1/4$$

$y = 1(1/4)^x$

18. (0, 2) and (1, 10)

$$a = ab^0$$

$$y = ab^x$$

$$a = 2$$

$$10 = ab^1$$

$$b = 5$$

$y = 2(5)^x$

19. (0, -3) and (1, -1.5)

$$-3 = ab^0$$

$$y = -3b^x$$

$$-3 = a$$

$$-1.5 = -3b^1$$

$$.5 = b$$

$y = -3(.5)^x$

Simplify each expression.

20. $(2\sqrt{2})\sqrt{8}$ $2^{\sqrt{16}} = 2^4 = 16$

21. $(n\sqrt{3})\sqrt{75}$ $n^{\sqrt{25}} = n^5$

22. $y^{\sqrt{6}} \cdot y^{5\sqrt{6}}$

23. $13^{\sqrt{6}} \cdot 13^{\sqrt{24}}$

$13^{\sqrt{6}} \cdot 13^{2\sqrt{6}}$
 $13^{3\sqrt{6}}$

24. $n^3 \div n^{\pi}$

$\frac{n^3}{n^{\pi}} = n^{3-\pi}$

25. $125^{\sqrt{11}} \div 5^{\sqrt{11}}$

$\frac{(5^3)^{\sqrt{11}}}{5^{\sqrt{11}}} = 5^{2\sqrt{11}}$

Solve each equation or inequality. Check your solution.

26. $3^{3x-5} > 81$

$3^{3x-5} > 3^4$

$3x-5 > 4$

$3x > 9$
 $x > 3$

28. $9^{2x-1} = 27^{x+4}$

$(3^2)^{2x-1} = (3^3)^{x+4}$

$4x-2 = 3x+12$

$x = 14$

27. $3^{6n-5} < 9^{4n-3}$

$3^{6n-5} < (3^2)^{4n-3}$

$6n-5 < 8n-6$

$1 < 2n$

$n > 1/2$

29. $16^{4n-1} = 128^{2n+1}$

$(2^4)^{4n-1} = (2^7)^{2n+1}$

$16n-4 = 14n+7$

$2n = 11$

$n = 11/2$