

1. What is the exact value of  $x$ :  $7 = 2^{x+1}$

A)  $\log\left(\frac{7}{2}\right) - 1$                       B)  $\frac{\log 7}{\log 2} + 1$

C)  $\log\left(\frac{7}{2}\right) + 1$                       D)  $\frac{\log 7}{\log 2} - 1$

2. Solve for  $x$ :  $2^{3x-1} = 8^{2x+1}$

A)  $x = -\frac{4}{3}$                       B)  $x = -1$

C)  $x = -\frac{2}{3}$                       D)  $x = -\frac{3}{4}$

3. Express  $\log\left(\frac{x^2}{10y^3}\right)$  in terms of  $\log x$  and  $\log y$ .

A)  $2\log x - 1 - 3\log y$

B)  $2\log x - 1 + 3\log y$

C)  $2\log x - 10 - 3\log y$

D)  $2\log x - 10 + 3\log y$

4. What is the value of  $\log_3 \sqrt{27}$  ?

A)  $x = \frac{2}{9}$                       B)  $x = \frac{2}{3}$

C)  $x = \frac{3}{2}$                       D)  $x = \frac{9}{2}$

5. What is the x-intercept of  $y = \log_2(x + 7)$ ?

- A) -7                      B) -6  
C) 0                         D) 3

6. If  $\log_2 5 = x$ , then  $\log_2 \sqrt[4]{25^3}$  is equivalent to which expression?

- A)  $\frac{3x}{2}$                       B)  $\frac{3x}{8}$   
C)  $x^{\frac{3}{2}}$                      D)  $x^{\frac{3}{8}}$

7. What is the value of x:  $3\left(5^{\frac{x}{2}}\right) = 12$ ?

- A)  $\frac{\log 5}{2 \log 4}$                  B)  $\frac{2 \log 5}{\log 4}$   
C)  $\frac{\log 4}{2 \log 5}$                  D)  $\frac{2 \log 4}{\log 5}$

8. Solve for x:  $(2x - 1)^{\frac{1}{2}} = \sqrt{3}$ .

- A) 0.74                      B) 1.37  
C) 2                          D) 2.73

9. What is the inverse of  $y = 3^x$ ?

- A)  $y = \log_x 3$                  B)  $y = \log_3 x$   
C)  $x = \log_3 y$                  D)  $x = \log_y 3$

10. Solve for  $x$ :  $\log_5(5x + 2) = \frac{1}{2}\log_5 49 + \log_5 16$ .

- A) 4.2  
B) 22  
C) 78  
D) 156.4

11. Which is  $m \log_p n = q$  written in exponential form?

- A)  $p^m = n^q$   
B)  $p^q = n^m$   
C)  $p^q = mn$   
D)  $p^{qm} = n$

12. Solve for  $x$ :  $\log_7(2x) + \log_7(x - 3) = \log_7 8$

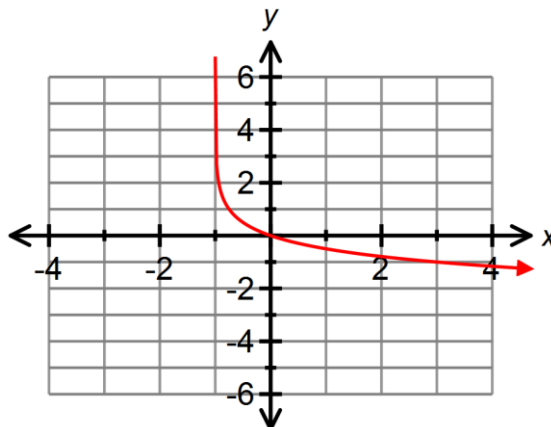
- A)  $x = 1$   
B)  $x = 4$   
C)  $x = 5$   
D)  $x = 6$

13. Solve for  $x$ :  $4^{x+1} = 3(7^{2x})$ .

- A)  $\frac{-\log 4}{\log 4 - 2\log 21}$   
B)  $\frac{-\log 4}{1 - 2\log 21}$   
C)  $\frac{\log 3 - \log 4}{\log 4 - 2\log 7}$   
D)  $\frac{\log 3 - \log 4}{1 - 2\log 7}$

14. Which function best represents the graph shown below?

- A)  $y = -\log_4(x - 1)$   
B)  $y = -\log_4(x + 1)$   
C)  $y = \log_4(x - 1)$   
D)  $y = \log_4(x + 1)$



15. Which expression is equivalent to  $\log \frac{\sqrt{BA}}{C^4}$  ?

- A)  $\frac{1}{2} \log B + \log A - 4 \log C$       B)  $\frac{1}{2} \log B + 4 \log \frac{A}{C}$   
C)  $\frac{\frac{1}{2} \log(B + A)}{4 \log C}$       D)  $\frac{\frac{1}{2} \log B + \log A}{4 \log C}$

16. What is the domain of  $y = \log_3(5 - x)$  ?

- A)  $x > 5, x \in \mathbb{R}$   
B)  $x > -5, x \in \mathbb{R}$   
C)  $x < 5, x \in \mathbb{R}$   
D)  $x < -5, x \in \mathbb{R}$

17. What is the domain of  $y = 3 \log_2(-2(x - 4)) + 7$  ?

- A)  $x > 4, x \in \mathbb{R}$   
B)  $x < 4, x \in \mathbb{R}$   
C)  $x > -8, x \in \mathbb{R}$   
D)  $x < -8, x \in \mathbb{R}$

18. What is the value of  $x$ :  $\log_x 125 = \frac{3}{2}$

- A) 5                      B) 10  
C) 25                     D) 125

19. Solve for x:

a)  $\log_{15}(3-x) - \log_{15}(1-x) = 1$

b)  $\log_9(x-5) + \log_9(x+3) = 1$

c)  $2\log_3 x - \log_3(2x+3) = 0$

d)  $\log_4(x^2 - 3x) = 1$

e)  $\log_4(\log_3 x) = 0$

f)  $\log_3(\log_x 125) = 1$

g)  $6^{\log x} = \frac{1}{36}$

h)  $\log_x 8 = \frac{3}{4}$

i)  $\log(x^2 + 12) = \log 8 + \log x$

20. The point  $\left(\frac{1}{32}, -5\right)$  is on the graph of the logarithmic function  $y = \log_c x$ . The point  $(k, 256)$  is on the graph of the inverse. Determine the value of c and k.

21. Strontium-90 has a half-life of 25 years. How many years will it take for a 50mg sample to decay to 20mg?

22. A vehicle purchased for \$34 000 depreciates at a rate of 75% every 6 years. Another vehicle purchased for \$18 000 depreciates at a rate of 50% every 4 years. Create an exponential function for each situation, and use the functions to algebraically determine the amount of time it would take for the two vehicles to be equal in value.

23. Use transformations to sketch the graph of  $y = -\log_2(x-1) + 4$