EXPONENTS and LOGARITHMS **F**

1. Change $a = b^c$ to logarithmic form.

   A. $\log_a b = c$
   B. $\log_b c = a$
   C. $\log_c a = b$
   D. $\log_b a = c$

$\log_b a = b^c$ $\log_b a = c$ $\log(xy) = \log x + \log y$ $\log x^r = r \log x$

2. Solve for y: $x = \log_{10} c^y$

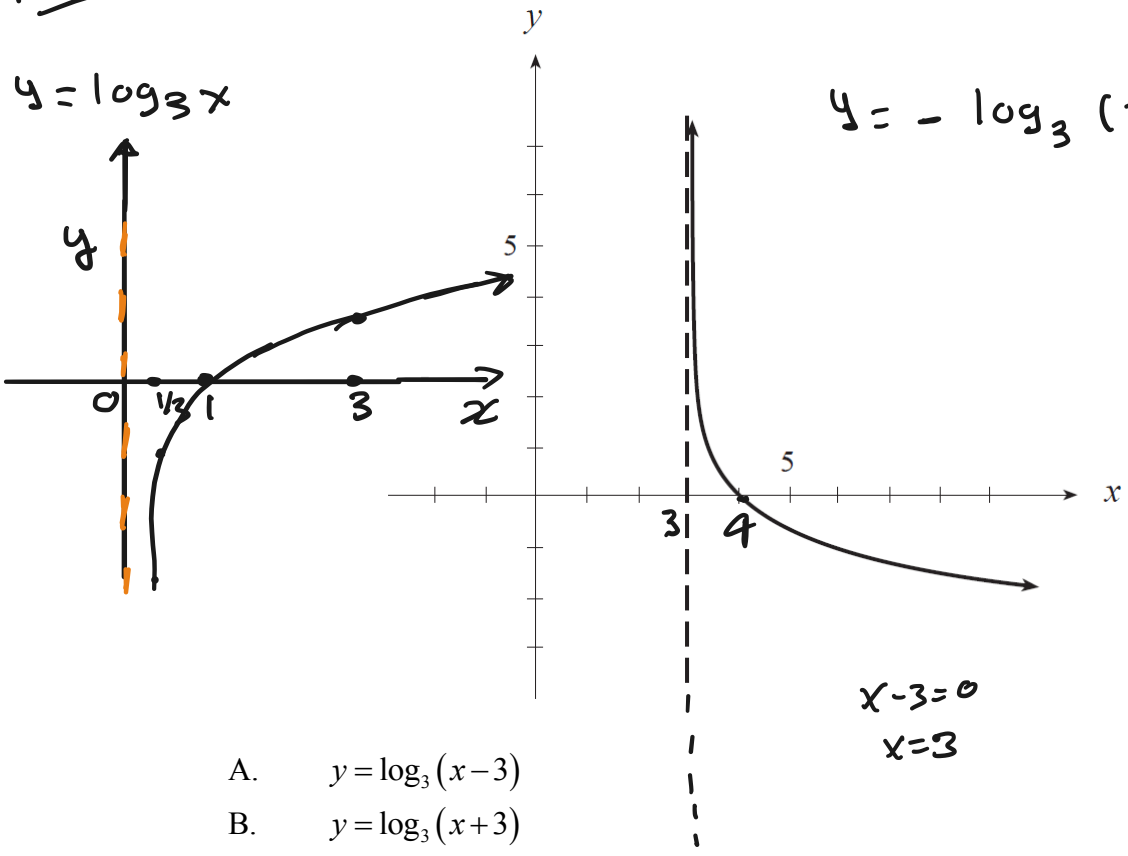
   A. $y = \dfrac{x}{\log c}$
   B. $y = \log c^x$
   C. $y = \dfrac{x}{c}$
   D. $y = x - \log c$

$x = y \log_{10} c$ $y = \dfrac{x}{\log_{10} c}$ $10^x = c^y$ $y = y \log c$ $\dfrac{x}{\log c} = y$ $x \log 10 = y \log c$

3. A population of insects doubles every 5 days. If there are currently 1200 insects, determine an equation for the population, P, of insects t days from now.

   A. $P = 1200\left(\dfrac{1}{2}\right)^{\frac{t}{5}}$
   B. $P = 1200\left(\dfrac{1}{2}\right)^{5t}$
   C. $P = 1200(2)^{5t}$
   D. $P = 1200(2)^{\frac{t}{5}}$

hard 4. Determine an equation of the logarithmic function graphed below.



$y = \log_3 x$

$y = -\log_3 (x-3)$

$x-3=0$

$x=3$

A. $y = \log_3(x-3)$

B. $y = \log_3(x+3)$

C. $y = -\log_3(x+3)$

(D) $y = -\log_3(x-3)$

Test Poin

$-\log_3(4-3)$

5. If $\log 5 = m$ and $\log 7 = n$, determine $\log \frac{35}{10}$ in terms of m and n.

$\log(xy) = \log x + \log y$

$\log\left(\frac{x}{y}\right) = \log x - \log y$

A. $\frac{mn}{10}$

B. $\frac{m+n}{10}$

(C) $m+n-1$

D. $m+n-10$

$\log\frac{(5)(7)}{10}$

$\log(5)(7) - \log 10$

$\log(5) + \log(7) - 1$

$m + n - 1$

$9^x = 3$ $3^{2x} = 3^1$ $9^? = 3$ $2x = 1$ $x = \frac{1}{2}$

$\log_3 9 = 2$ $\log_8 2 = \frac{1}{3}$

$\log_9 3 = \frac{\log_3 3}{\log_3 9} = \frac{1}{2}$

*** hard

6. Solve: $(\log_2 8)^x - (\log_9 3)^{x+1} = 0$

A. –0.50
B. –0.39
C. –0.33
D. 1.71

$(3)^x - \left(\frac{1}{2}\right)^{x+1} = 0$

$x\log 3 - (x+1)\log(0.5) = 0$

$x\log 3 - (x\log(0.5) + \log(0.5)) = 0$

$x\log 3 - x\log(0.5) - \log(0.5) = 0$

$x(\log 3 - \log(0.5)) - \log(0.5) = 0$

$x = \frac{\log(0.5)}{\log 3 - \log(0.5)} = -0.386 = -0.39$

7. Solve for x: $\log_5 x = 3$

A. $\frac{3}{5}$
B. $\frac{5}{3}$
C. 3^5
D. 5^3

$5^3 = 5$

$x = 5^3$

8. Which of the following expressions is equivalent to $\log(mn)^2$?

A. $2\log m + \log n$
B. $(\log m + \log n)^2$
C. $\log m + 2\log n$
D. $2\log m + 2\log n$

$2\log(mn)$

$2(\log m + \log n)$

$2\log m + 2\log n$

9. Determine an equation of the asymptote of $y = 2\log_3(x+1) + 4$.

A. $x = -1$
B. $x = 1$
C. $y = -4$
D. $y = 4$

$x + 1 = 0$

$x = -1$

$x + 1 > 0$

$x > -1$

domain

$x = -1$ VA

10. Solve: $\log_3(x+2) - \log_3 5 = 2$

A. $-\frac{8}{5}$
B. $-\frac{1}{5}$
C. 12
D. 43

$\log\frac{(x+2)}{5} = 2$

$3^3 = 5$

$\frac{x+2}{5} = \frac{9}{1}$

$x + 2 = 45$

$x = 45 - 2$ $x = 43$

$\log_a a = 1$

11. Given $a > 1$ and $\log_a 2 = b$, which expression is equivalent to $\log_a\left(\log_a a^8\right)$?

A. b^3
B. b^4
C. $3b$
D. $4b$

$\log_a(8)$

$\log_a(2)^3$

$3\log_a(2)$

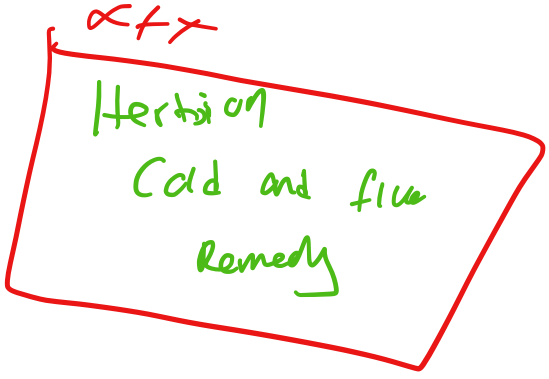
$3b$

12. Change $\log_a b = c$ to exponential form.

A. $b = a^c$
B. $b = c^a$
C. $a = b^c$
D. $a = c^b$

$a^{\log_a b} = a^c$

$b = a^c$



13. Evaluate: $\log 2^{2000}$

A. 0
B. 10.97
C. 602.06
D. infinitely large

$2000\log(2)$

$2000(0.301029)$

602.05

14. What is the domain of $y = \log(x-a)+b$, if a and b are constants?

A. $x > a$
B. $x < a$
C. $x > b$
D. $x < b$

$x - a > 0$

$x > a$

15. Solve: $\log_2(3-x)+\log_2 x = 1$

A. 1
B. 2
C. 1, 2
D. no solution

$\log_2(3-x)(x) = 1$

2

$(3-x)(x) = 2$

$3x - x^2 = 2$

$x^2 - 3x + 2 = 0$

$(x-2)(x-1)$ $\quad x = 1,\ x = 2$

$(3-2) = 1$ ✓

$(3-1) = 2$ ✓

16. Solve for x: $3^{5x} = 8$

A. $x = \dfrac{\log 8}{5\log 3}$

B. $x = \dfrac{\log 3}{5\log 8}$

C. $x = \dfrac{\log 8}{\log 3} - 5$

D. $x = \dfrac{\log 3}{\log 8} - 5$

$5x\log 3 = \log 8$

$x = \dfrac{\log 8}{5\log 3}$

17. If $\log_x 3 = a$ and $\log_x 49 = b$, express $\log_x\left(\dfrac{9}{7}\right)$ in terms of a and b.

HARD

A. $\dfrac{a^2}{\sqrt{b}}$

B. $a^2 - \sqrt{b}$

C. $2a - \sqrt{b}$

D. $2a - \dfrac{1}{2}b$

$\log_x 7^2 = b$

$2\log_x 7 = b$

$\log_x 7 = \dfrac{b}{2}$

$\log_x 9 - \log_x 7$

$\log_x (3)^2 - \log_x 49^{1/2}$

$2\log_x 3 - \dfrac{1}{2}\log_x 49$

$a \qquad b$

$2a - \dfrac{1}{2}\cdot b = 2a - \dfrac{b}{2}$

↑↑↑ Interesting!!

18. Change $y = \log x$ to exponential form.

A. $x = 10^y$

B. $x = 10y$

C. $x = y^{10}$

D. $x = 10^{-y}$

$y = \log x$

$10 \qquad 10$

$10^y = x$

19. Express as a single logarithm: $\log a - 3\log b + 2\log c$

$\log a - \log b^3 + \log c^2$

Extra Practice

A. $\log \dfrac{ac^2}{b^3}$

B. $\log \dfrac{a}{b^3c^2}$

C. $\log \dfrac{ab^3}{c^2}$

D. $\log(a - 3b + 2c)$

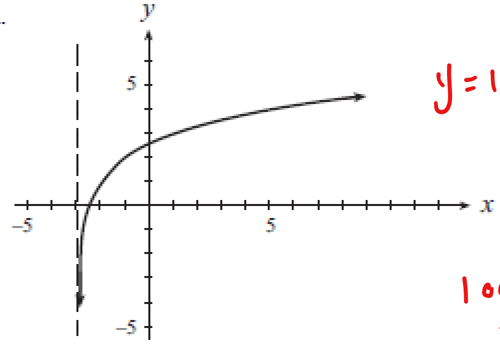
$\log \dfrac{ac^2}{b^3}$

$\log\left(\dfrac{a}{b^3}\right) + \log c^2$

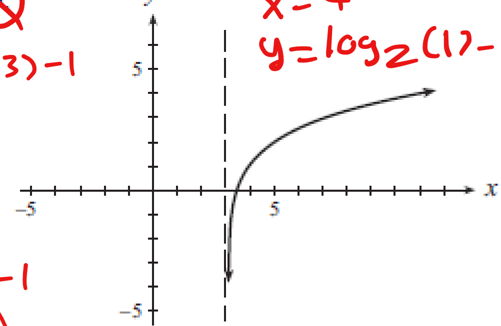
$\log\left(\dfrac{ac^2}{b^3}\right)$

20. Which graph best represents the function $y = \log_2(x-3)-1$.

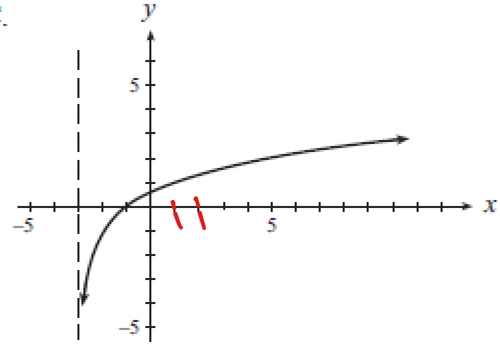
A.



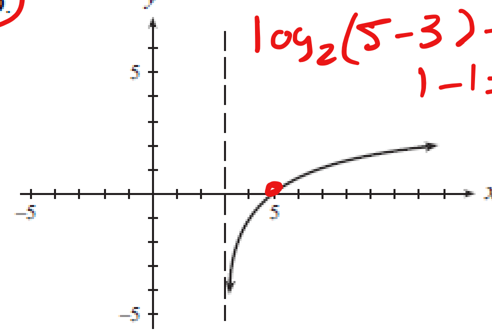
B.



C.



D.



21. Determine the equation of the asymptote of the graph of $y = \left(\frac{1}{2}\right)^{x+3} - 2$.

A. $x = -3$
B. $x = 3$
C. $y = -2$
D. $y = 2$

22. Solve for x: $A^x - B = 0$

A. $x = \log A - \log B$
B. $x = \log B - \log A$
C. $x = \dfrac{\log A}{\log B}$
D. $x = \dfrac{\log B}{\log A}$

23. A colony of termites has a population of 12 000. The population is decreasing at a rate of 4% per year. Which expression below represents the population after 26 years?

$P = P_0(1-r)^t$

$A = A_0(1-R)^t$

$A = 12000(0.96)^{26}$

A. $12000(0.04)^{26}$

B. $12000(0.60)^{26}$

C. $12000(0.96)^{26}$

D. $12000(1.04)^{26}$

(n, m)

24. The point (m,n) is on the graph of $f(x)=a^x$. Which of the following must be a point on the graph of $g(x)=-\log_a x$ $(a>0,\ a\neq 1)$?

$(m,n) \xrightarrow{f^{-1}} (n,m) \xrightarrow{y \to -y} (n,-m)$

A. (n,m)

B. $(n,-m)$

C. $(m,-n)$

D. $(-m,n)$

$g(x) = \log_a(-x)$

EXPONENTS and LOGARITHMS **F**

1. **D**
2. **A**
3. **D**
4. **D**
5. **C**
6. **B**
7. **D**
8. **D**
9. **A**
10. **D**
11. **C**
12. **A**
13. **C**
14. **A**
15. **C**
16. **A**
17. **D**
18. **A**
19. **A**
20. **D**
21. **C**
22. **D**
23. **C**
24. **B**