Name:_____

M12P Ch7 Practice Test Exponential and Logarithmic Functions

1.   Express $3\log a + \log b - \log c$ as a single logarithm.

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

2.   Solve for x: $\log_x 8 = \dfrac{3}{2}$

   a) 4   b) $\dfrac{16}{3}$ c) $\dfrac{26}{3}$ d) 64

3.   Evaluate: $\log_7 13$.

   a)   0.76   b)   1.19   c)   1.32   d)   1.86

4.   Determine the equation of the asymptote for the graph of $y = 2\log_3(2x+4) - 1$.

   a) $x = -1$ b) $x = -2$ c) $x = -4$ d) $x = 4$

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

   a) $\left(\dfrac{-8}{5}\right)$ b) $\left(\dfrac{-1}{5}\right)$ c) 12   d) 43

6.   What is the inverse of $y = 2^x$

   a) $y = \log_2 x$ b) $y = \log_x 2$ c) $y = \left(\dfrac{1}{2}\right)^x$ d) $y = x^2$

7.   Solve: $\log_3(2x+3) + \log_3(x+5) = 2$.

   a) $\tfrac{-1}{2}$ b) -6   c) $\tfrac{-1}{2}$ and -6   d) no solution

8.   Solve for x: $3^x = 4$.

   a) $\dfrac{4}{3}$ b) $\log_3 4$ c) $\log_4 3$ d) $\log\left(\tfrac{4}{3}\right)$

9.   The equation $2 = \log_{x+1}(y+1)$ can also be written as __.

a) $y = \dfrac{2}{\log_{x+1}} - 2$ b) $y = (x+1)^2 - 1$ c) $y = 2(x+1) - 1$ d) $y = \log_{x+1} 2 - 1$

10.   What is the y-intercept for the graph of the function $y = 2\log_{16}(x+1) - 1$?

a) 5   b) 7   c) -1   d) 3

11.   The graph of $y = \log_3 x$ has been transformed. It has been reflected in the x axis, horizontally stretched by a factor of 2 and translated 6 units left. What is its new equation?

a) $y = -\log_3 \frac{1}{2}(x+6)$ b) $y = \log_3(-2(x+6))$

c) $y = -\log_3 2(x+6)$ d) $y = -\log_3(\frac{1}{2}x+6)$

12.   Determine an expression for "x" if $\log x = \log a - 2\log b + \dfrac{1}{4}\log c$.

a) $\dfrac{a}{b^2 \sqrt[4]{c}}$ b) $\dfrac{a\sqrt[4]{c}}{b^2}$ c) $\dfrac{a}{c^4 \sqrt{b}}$ d) $\dfrac{ac^4}{\sqrt{b}}$

13.   Solve for "x" $\log_{0.5} x^2 = \log_{0.5} \frac{1}{9}$

a) ± 3 b) $\pm \dfrac{1}{3}$ c) $\dfrac{1}{3}$ d) 3

14.   The graph of $y = \log_2 \sqrt{x}$ is the same as ___.

a) the graph of $y = \log_2 x$ with a vertical stretch factor of $\frac{1}{2}$
b) the graph of $y = \log_2 x$ with a vertical stretch factor of 2
c) the graph of $y = \log_2 x$
d) the graph of $y = \log_2 x$ with a vertical translations of $\frac{1}{2}$ unit up

15.   The domain for the function $y = 3\log_5(2x-17) - 6$ is ____.

a) $x > -6$ b) $x \in \mathcal{R}$ c) $x < \dfrac{17}{2}$ d) $x > \frac{17}{2}$

16.   Solve: $3^{x+1} = 5$.

a) $\dfrac{\log 3}{\log 5} - 1$ b) $\dfrac{\log 3}{\log 5} + 1$ c) $\dfrac{\log 5}{\log 3} - 1$ d) $\dfrac{\log 5}{\log 3} + 1$

17

Use the equation $600 = 300(1.0075)^{4t}$ to determine the time in years (to the nearest year) it will take an investment of $300 to double when it is invested in an account that pays 3% annual interest, compounded quarterly.

A. 23 years   C. 24 years

B. 12 years   D. 1 year

18

Write this logarithmic expression as an exponential expression: $\log_5\left(\frac{1}{125}\right) = -3$

A. $5 = \left(\frac{1}{125}\right)^{-3}$ C. $\frac{1}{125} = (-3)^5$

B. $5^{\frac{1}{125}} = -3$ D. $\frac{1}{125} = 5^{-3}$

19

Write this logarithmic expression as an exponential expression: $\log_9\left(\sqrt[3]{81}\right) = \frac{2}{3}$

A. $\sqrt[3]{81} = 9^{\frac{2}{3}}$ C. $9^{\sqrt[3]{81}} = \frac{2}{3}$

B. $\sqrt[3]{81} = \left(\frac{2}{3}\right)^9$ D. $9 = \left(\sqrt[3]{81}\right)^{\frac{2}{3}}$

20

The pH scale measures the acidity or alkalinity of a solution. A solution that has a pH of 7 is neutral. For ea increase of 1 pH, a solution is 10 times as alkaline. For each decrease of 1 pH, a solution is 10 times as acid

A sample of soap has a pH of 9.5. A sample of household ammonia has a pH of 11.4.
To the nearest whole number, how many times as alkaline as the soap is the ammonia?

A. 79 times as alkaline   C. 40 times as alkaline

B. 12 times as alkaline   D. 2 times as alkaline

21

Solve $4^{7x-9} = 7^{x+4}$. Round your answer to two decimal places.

A. 1.74   C. −0.60

B. 1.54   D. 2.61

22

If $\log 3 = s$, $\log 5 = u$, and $\log 7 = y$, an algebraic expression in terms of s, u, and y for $\log\frac{5}{441}$

A. $u - 2s + 2y$ C. $u - 2(s + y)$

B. $u - 2(s - y)$ D. $u - 2s + y$

23

An investment of $500 is placed into an account that earns interest, compounded annually, at a rate of 6% 10 years. The amount, A, in the account can be modelled by the function $A = 500(1.06)^t$, where t is the tim in years. What is the domain of this function?

A. $\{t \mid t \geq 10, t \in R\}$ C. $\{t \mid 0 < t < 10, t \in R\}$

B. $\{t \mid 0 \leq t \leq 10, t \in R\}$ D. $\{t \mid t > 10, t \in R\}$

24   Which set of properties does the function $y = 4^x$ have?
- **A.** no x-intercept, no y-intercept
- **B.** x-intercept is 1, no y-intercept
- **C.** no x-intercept, y-intercept is 1
- **D.** x-intercept is 0, y-intercept is 0

25   The present value formula is used when an amount, PV dollars, is borrowed and then repaid through a seri of equal payments at equal time intervals, and the compounding period of the interest is equal to the time interval for the payments. The first payment is made after a time equal to the compounding period. The

formula is: $PV = \dfrac{R[1 - (1 + i)^{-n}]}{i}$, where R dollars is the regular payment, i is the interest rate per

compounding period, and n is the number of payments.

A person has a balance of $274.51 on a credit card. The credit card charges 20% annual interest, compoun monthly. The minimum payment is $10 per month. If the person does not make any more purchases using card, and pays only the minimum payment each month, how long will it take before the balance is paid off the nearest month?

- **A.** 23 months
- **B.** 40 months
- **C.** 17 months
- **D.** 37 months

26   The Richter scale measures the intensity of an earthquake. The magnitude, M, of an earthquake can be

determined using the function $M = \log\left(\dfrac{I}{S}\right)$, where I microns is the intensity of the earthquake, and S micron

is the intensity of a standard earthquake.

In June 2010, California experienced an earthquake with magnitude 5.7.
In October 2010, Indonesia experienced an earthquake with magnitude 7.7.
How many times as intense as the California earthquake was the Indonesia earthquake?

- **A.** 10^2 times as intense
- **B.** 3 times as intense
- **C.** 10^3 times as intense
- **D.** Approximately 1.4 times as intense

27   Use the equation $600 = 300(1.0075)^{4t}$ to determine the time in years (to the nearest year) it will take an investment of $300 to double when it is invested in an account that pays 3% annual interest, compound quarterly.

- **A.** 23 years
- **B.** 12 years
- **C.** 24 years
- **D.** 1 year

**WRITTEN RESPONSE SECTION: Show all your work and steps**

28.   The population of a bacterial culture doubles every 6 hours. If the present population is 4000 bacteria, how long will it take for the population to reach 75 000. (round answer to nearest hour)

(4)

29.   Algebraically solve for x: (4)

$$\log_7(x+2) + \log_7(x-4) = 1$$

30.   Graph $y = -3\log_2(4x+6) - 5$ without the use of technology. Answer the following questions first
.
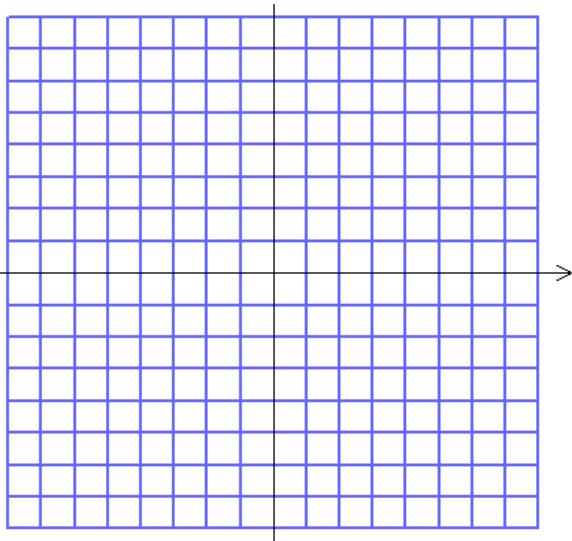
Domain _____

Asymptote _____

x-intercept: show work

31.   When Mrs. Windsor is speaking, her voice has a decibel level of 55. When she gets excited it raises to 80 decibels. How much more intense is her excited voice compared to her calm voice? (4)

$$\beta = \log\frac{I}{10^{-12}}$$

32. A national park has a population of 5000 deer in the year 2016. Conservationists are concerned because the deer population is decreasing at the rate of 7% per year. If the population continues to decrease at this rate, how long will it take until the population is only 3000 deer?

33. For what values of "K" does the equation $16^x = 64^{(x^2+k)}$ have no real solutions?

34.

a) Use transformations to sketch the graph of the exponential function $y = 2^{-3(x+1)} + 1$.

b) Determine:
i) whether the function is increasing or decreasing
ii) the intercepts
iii) the equation of the asymptote
iv) the domain of the function
v) the range of the function
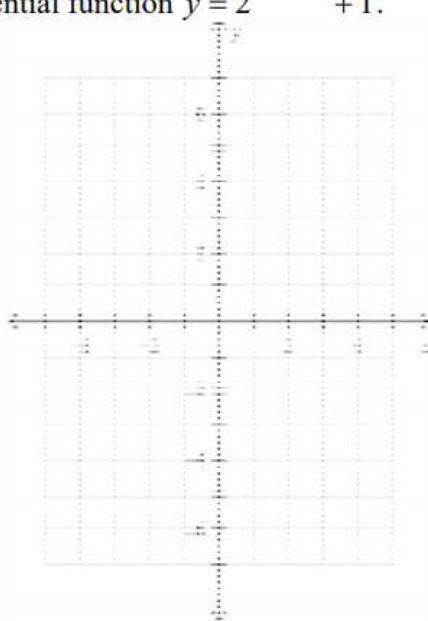
35. Solve the equation for "x": $\log \sqrt[3]{x^2 + 48x} = \dfrac{2}{3}$

36. Solve for "x": $2\ln(x+1) - 3 = 11$

37. Solve for "x": $2\ln(4-2x) + \ln(9-3x) - 2\ln(x+1) = 0$

38. Solve for "x" $3 \times e^{2\ln x - \ln(x+2)} = 8$

39. An archeologist finds a fossil that contains 47.113mg of C-14 in 1923. 100 years later in 2023, the same piece of fossil has 46.359mg of C-14. What is the half life of the fossil? How much C-14 did the fossil have in the beginning?