

Mathematics 3200
Test Unit 7/8
Exponential/Logarithmic Functions

Name: _____

Part A: Place the letter corresponding to the correct answer to each of the following in the blank at the right.

1. Which of the following is an decreasing exponential function? 1. ____

(A) $y = \left(\frac{1}{3}\right)^x$

(B) $y = \left(\frac{5}{3}\right)^x$

(C) $y = \frac{1}{2}(3)^x$

(D) $y = \log_2(x)$

2. Which transformation of $y = (2)^x$ produces the graph for $y = (2)^{2x+10} + 3$? 2. ____

	Horizontal Translation	Vertical Translation
(A)	10 Left	3 Down
(B)	10 Right	3 Down
(C)	5 Left	3 Up
(D)	5 Right	3 Up

3. What is the range for the function defined by the equation $y = 2^{-x} + 3$? 3. ____

(A) $\{y / y < -3, y \in R\}$

(B) $\{y / y > -3, y \in R\}$

(C) $\{y / y < 3, y \in R\}$

(D) $\{y / y > 3, y \in R\}$

4. What is the equation for the horizontal asymptote for the equation $y = 3(2)^{x-1} + 5$? 4. ____

(A) $y = -5$

(B) $y = -1$

(C) $y = 1$

(D) $y = 5$

5. Solve $2^x = \sqrt{32}$ 5. ____

- (A) $\frac{1}{5}$ (B) $\frac{2}{5}$
(C) $\frac{5}{2}$ (D) 5

6. Which transformation of $y = (3)^x$ produces the graph for $y = \frac{1}{4}(3)^{0.5x-2} + 6$? 6. ____

	Horizontal Stretch Factor	Vertical Stretch Factor
(A)	$\frac{1}{2}$	$\frac{1}{4}$
(B)	2	$\frac{1}{4}$
(C)	$\frac{1}{2}$	4
(D)	2	4

7. Solve $5^{2x-3} = \left(\frac{1}{125}\right)^x$ 7. ____

- (A) -3 (B) $-\frac{3}{5}$
(C) $\frac{3}{5}$ (D) 3

8. What is the y intercept of the equation $y = -3(2)^{2(x-3)} - 4$? 8. ____

- (A) -40 (B) -7
(C) -3 (D) 32

9. Solve $3^{x+1} = 5$ 9. ____

- (A) $\frac{\log 3}{\log 5} - 1$ (B) $\frac{\log 3}{\log 5} + 1$
(C) $\frac{\log 5}{\log 3} - 1$ (D) $\frac{\log 5}{\log 3} + 1$

10. Solve: $\frac{1}{3} \cdot 7^{2x+1} = 2$ 10. ____

- (A) -0.53 (B) -0.04
(C) 0.04 (D) 0.53

11. What is the x intercept for $y = \log_2(x-2) - 4$? 11. ____

- (A) -5 (B) -1
(C) 14 (D) 18

12. What is the mapping rule for $y = 2\log\frac{1}{3}(x-4)+5$? 12. ____

- (A) $(x, y) \rightarrow \left(\frac{1}{3}x - 4, 2y + 5\right)$ (B) $(x, y) \rightarrow \left(\frac{1}{3}x + 4, 2y + 5\right)$
(C) $(x, y) \rightarrow (3x - 4, 2y - 5)$ (D) $(x, y) \rightarrow (3x + 4, 2y + 5)$

13. Solve: $3^{x+1} = 5(4^{2x})$ 13. ____

- (A) $\frac{-\log 3}{1 - 2\log 20}$ (B) $\frac{-\log 3}{\log 3 - 2\log 20}$
(C) $\frac{\log 5 - \log 3}{1 - 5\log 4}$ (D) $\frac{\log 5 - \log 3}{\log 3 - 2\log 4}$

14. What is $3^y = (x+1)$ in logarithmic form? 14. ____

- (A) $\log_3(x+1) = y$ (B) $\log_3 y = x+1$
(C) $\log_y 3 = x+1$ (D) $\log_y(x+1) = 3$

15. Which of the following is $4\log_b x = y$ in exponential form? 15. ____

- (A) $b^y = x^4$ (B) $b^y = 4x$
(C) $b^x = y^4$ (D) $b^{4x} = y$

16. Solve: $\log_2 x + \log_2 5 = \log_2 20$ 16. ____

- (A) 4 (B) 5
(C) 15 (D) 100

17. What is $2\log A + \log B - 5\log C$ written as a single log?

17. ____

- (A) $\log(A^2 + B - C^5)$ (B) $\log\left(\frac{A^2 B}{C^5}\right)$
 (C) $\log(2A + B - 5C)$ (D) $\log\left(\frac{2AB}{5C}\right)$

18. What is the domain for $y = \log_2(x - 4) + 5$?

18. ____

- (A) $\{x/x > -5, x \in R\}$ (B) $\{x/x > -4, x \in R\}$
 (C) $\{x/x > 4, x \in R\}$ (D) $\{x/x > 5, x \in R\}$

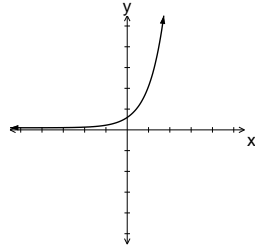
19. Simplify: $\log_3 81 - \log_2 32 + 2\log_5 25$

19. ____

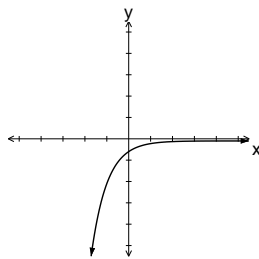
- (A) -8 (B) 2
 (C) 3 (D) 8

20. Which represents the inverse of the graph of $f(x)$ shown below?

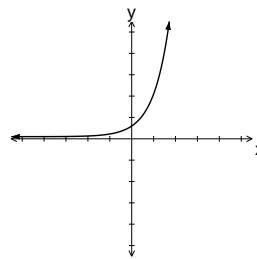
20. ____



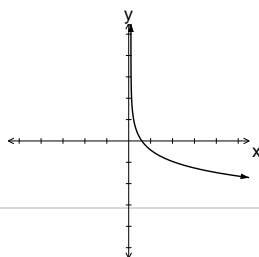
(A)



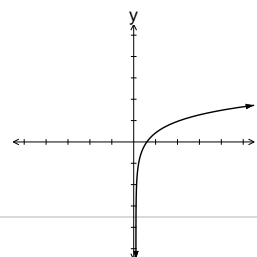
(B)



(C)



(D)



21. Solve for x : $\log_2 x + \log_2 4 = 4$.

21. ____

- (A) 3
- (C) 8

- (B) 4
- (D) 16

22. The temperature, T , of a cup of coffee with respect to time, m , in minutes is given by the equation below. What is the initial temperature, in degrees Celsius, of the coffee?

22. ____

$$T = 73(0.90)^m + 22$$

- (A) 22
- (C) 90

- (B) 73
- (D) 95

Part B: Answer each question and show all workings.

1. Solve each of the following

(A) $8^{x+1} = 16\left(\frac{1}{4}\right)^{x+3}$

(B) $(\sqrt{3})^x = 9^{2x+5}$

2. Solve each of the following

(A) $\log(x^2 - 1) - \log(x - 1) = 1$

(B) $\log_6(x - 3) + \log_6(x + 6) = \log_6 10$

3. The intensity of sound is measured in decibels(dB). The level of sound, B, in decibels, is given by

$B = 10 \log \left(\frac{I}{I_0} \right)$, where I is the intensity of sound, in Watts per square metre(W/m^2) and I_0 is $-10^{-12} W/m^2$. What is the intensity of sound inside of a car if its sound level is 39 dB?

4. Solve: $2^{2x-5} = 6^{x+2}$

5. Joe purchases a truck for \$50 000 and it depreciates at 50% every 6 year. Dave purchases an Antique Super Jag ski doo for \$25 000 that decreases in value at a rate of 25% every 4 years. How long will it take for the truck and ski doo be equal in value?