## **Logarithms - Test**

Date:

## Multiple Choice

For #1 to 6, select the best answer.

1. The graph of  $f(x) = \log_b x$ , b > 1, is translated such that the equation of the new graph is expressed as y-2=f(x-1). The domain of the new function is

**A**  $\{x \mid x > 0, x \in R\}$ 

C  $\{x \mid x \ge 2, x \in R\}$ 

**B**  $\{x \mid x > 1, x \in R\}$ 

**D**  $\{x \mid x > 3, x \in \mathbb{R}\}$ 

2. The x-intercept of the function  $f(x) = \log_5 x + 3$  is

**A**  $5^{-3}$  **B** 0 **C** 1 **D**  $5^3$ 

3. The equation  $y = \frac{1}{3} \log_2 x$  can also be written as

**A**  $y = 2^{\frac{x}{3}}$  **B**  $x = 2^{\frac{y}{3}}$  **C**  $2^{3x} = y$  **D**  $2^{3y} = x$ 

**4.** The range of the inverse function,  $f^{-1}$ , of  $f(x) = \log_4 x$ , is

A  $\{y \mid y > 0, y \in R\}$ 

**C**  $\{ v | v \ge 0, v \in \mathbb{R} \}$ 

**B**  $\{y \mid y < 0, y \in R\}$ 

**D**  $\{ y | y \in \mathbb{R} \}$ 

5. A graph of the function  $y = \log_3 x$  is transformed. The image of the point (3, 1) is (6, 3). The equation of the transformed function is

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

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

**B**  $v = 3 \log_3 (x + 3)$ 

**D**  $y + 3 = \log_3(x + 3)$ 

6. If  $\log_{27} x = y$ , then  $\log_9 x$  equals

**A**  $\frac{3y}{2}$  **B**  $\frac{2y}{3}$  **C** 3y **D**  $4^y$ 

## **Short Answer**

7. If  $\log_3 5 = x$ , express  $2\log_3 45 - \frac{1}{2}\log_3 225$  in terms of x.

8. Determine the value of x algebraically.

**a)** 
$$\log_4 x = -3$$

**b)** 
$$\log_x 64 = \frac{2}{3}$$

c) 
$$5^{\log_5 25} = x$$

**d)** 
$$\log_3 (x+1)^2 = 2$$

e) 
$$\log_2(\log_x 256) = 3$$

9. Solve for x. CHECK YOUR ANSWERS. Clearly identify all valid answers.

a) 
$$\log (2x-3) + \log (x-2) = \log (2x-1)$$

**b)** 
$$\log (x-7) - \log (x-3) = \log (2x+1)$$

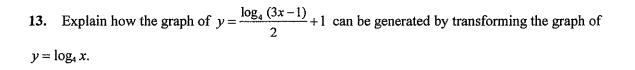
c)	$2 \log_2(x-4) - \log_2 x = 1$	
c)	2.1082 (x - 4) - 1082 x - x	

10. The point (6, -4) lies on the graph of  $y = \log_b x$ . Determine the value of b to the nearest tenth.

## **Extended Response**

11. Solve the equation  $5^x = 104$ , graphically and algebraically. Round your answer to the nearest hundredth.

- 12. Given  $f(x) = \log_3 x$  and  $g(x) = \log_3 9x$ .
  - a) Describe the transformation of f(x) required to obtain g(x) as a stretch.
  - b) Describe the transformation of f(x) required to obtain g(x) as a translation.
  - c) Determine the x-intercept of f(x). How can the x-intercept of g(x) be determined using your answer to parts a) or b)?



- 14. Identify the following characteristics of the graph of the function  $y = 2 \log_4 (x + 1) + 3$ .
  - a) the equation of the asymptote

b) the domain and range

c) the x-intercept and the y-intercept

15. An investment of \$2000 pays interest at a rate of 3.5% per year. Determine the number of months required for the investment to grow to at least \$3000 if interest is compounded monthly.

16.	Radioactive iodine-131 has a half-life of 8.1 days. How long does it take for the level of radiation to reduce to 1% of the original level? Express your answer to the nearest tenth.	on